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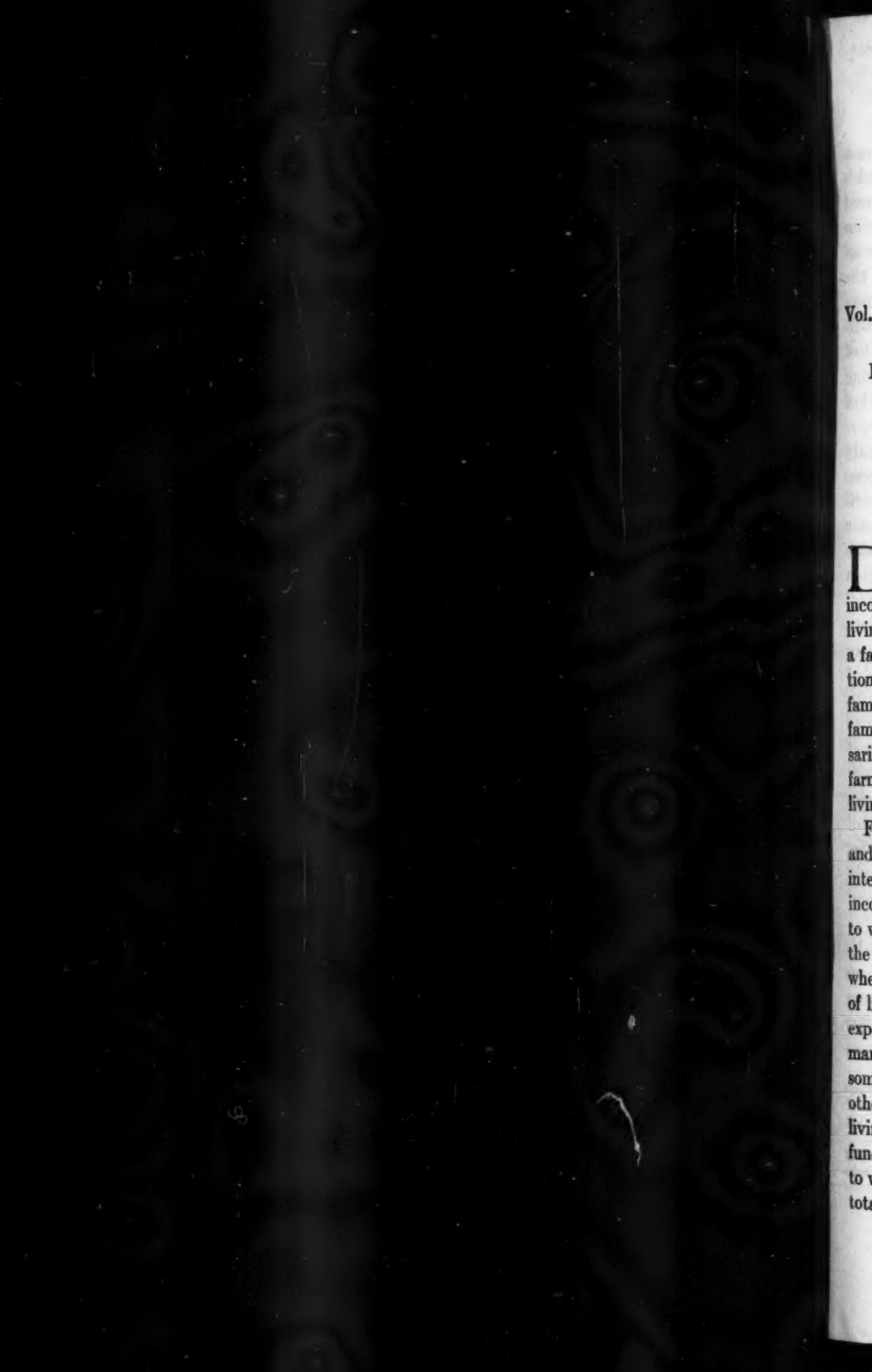

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ELASTICITIES OF EXPENDITURES FOR FARM FAMILY LIVING, FARM PRODUCTION, AND SAVINGS, UNITED STATES, 1946

T. Wilson Longmore and Carl C. Taylor
Bureau of Agricultural Economics

Introduction

DAY after day and year after year farm families make almost countless decisions as to how they will spend their current and prospective incomes; whether for more effective farm production, for better levels of living, or for investments and savings. Because farming is predominantly a family enterprise, expenditures for farm family living and farm production automatically compete for shares of family budgets. The lower the family income the keener is the competition between farming ends and family needs. If income falls quite low, all types of expenditures are necessarily reduced or the family must go into debt in order to continue effective farm production and at the same time to maintain its accustomed level of living.

Funds for savings and investments are the residual after production and family necessities are met. A corollary to this is that most families intermittently save, draw on their reserves, or go into debt as their annual incomes fluctuate. It is not generally known, under these circumstances, to what extent the expenditure of funds to maintain farm production and the expenditure of funds to maintain levels of living modify each other; whether families with low or falling incomes more often restrict their level of living in order to keep up farm production, or restrict farm production expenditures in order to maintain their accustomed level of living. A great many farm family level of living studies have been made which prove that some components of or items in the level of living are more flexible than others. Some farm-management studies of farm operations and family living have shown which items are most and least readily eliminated when funds are short. But little attention and study have been given to determine to what extent total expenditures for farm operations on the one hand and total expenditures for family living on the other modify each other.

An analysis which used data from the 1935–36 Consumer Purchase Study revealed that there are points on the scale of rising incomes at which farm families begin to save or make investments.[1] This analysis showed also that farm families with incomes immediately below these points on the scale of incomes resolved the conflict between unmet desires for an established level of living on the one hand and the lack of income on the other by going into debt to implement their desires. Because the study from which these data were taken did not contain information on expenditures for farm operations, it was impossible to ascertain just what part of their borrowed money families used to support accustomed levels of living expenditures and what part they used to support their accustomed level of farm operations.

Cochrane and Grigg approached an answer to these questions in a study of the budgetary behavior of two groups of corn belt farmers.[2] Their analyses showed, as had the Consumer Purchase study, that elasticity of expenditures for capital investment and debt payments was considerably greater than elasticity of expenditures for family living. If the expenditures which Cochrane and Grigg call "cash operating expenditures" and that portion of "capital expenditures" which was for "farm machinery equipment, etc." can be taken roughly to be farm operating expenditures, then their data show not only that farm operating expenditures are considerably more elastic than level of living expenditures, but that the accumulation of debt or depletion of liquid assets is more generally used by families with low or falling income to maintain their accustomed level of living than to maintain an accustomed level of farm operation. High income groups tend to increase their level of living expenditures much less than they do their farm operating expenditures with increases in incomes. Their data also reveal an additional important difference between the two major types of expenditures, namely, that although family living expenditures increase considerably as income rises, the increase is quite regular and relatively slow, whereas farm operating expenditures increase quite irregularly and with rapidity.

In a commercial economy such as ours, farm families purchase many elements of their level of living—clothing, health services, housing, and even food—as physical necessities. Expenditures for these and such minimum luxuries as tobacco are the least flexible of all things they purchase.[3] But an established level of living consists of considerably more than these

[1] See Lloyd Fisher, "Standards and Levels of Living of Prospective Settlers on New Irrigation Projects," and R. R. Swiger and E. A. Schuler, "Farm Family Levels and Standards of Living in the Plains and Northwest," *Columbia Basin Joint Investigations, Standards and Levels of Living*, United States Department of the Interior, Bureau of Reclamation.

[2] Willard W. Cochrane and Mary D. Grigg, *The Changing Composition of Family Budgets for Selected Groups of Corn Belt Farmers, 1940–42*, Bureau of Agricultural Economics, Washington, D. C., October, 1946.

[3] Swiger and Schuler, *op. cit.* p. 29.

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necessities. It is a complex or cluster of habits and standards which are considered by the family to be fairly rigid social or cultural requirements. Thus, to have not mere shelter but housing which meets acceptable standards; not merely to be clad, even well clad, but to be acceptably well dressed; to educate one's children, and to participate in institutional, community, and recreational activities are social and cultural desires which are relatively imperious. Physical necessities plus these culturally or socially stimulated desires apparently tend to make farm families resist any sharp decline in their accustomed levels of living.

Thus, considerable evidence exists to indicate that of the three major expenditures for which farm families utilize their yearly incomes—farm operation, family living, and investments or savings—the expenditures for family living tend to have top priority. For this reason it is hypothecated that, of the three major expenditure groups, those for farm family living are the least flexible. If this is true, then an analysis of the behavior of farm family levels of living is essential to an understanding of the economic operation of the whole agricultural plant. This study was launched to test the validity of such an hypothesis.

The Data

The study is based on family reports of annual expenditures and incomes collected in January, 1947, on 4,057 farm families representing the farm population of the United States. The enumerative survey data were gathered by trained individuals during personal interviews with the homemakers, and represent the incomes and expenditures of the sample families for the calendar year 1946.[4] The data obtained from each family consist of the family's gross cash income for the period January 1 to December 31, 1946; its corresponding aggregates of expenditures for farm production, family living, and savings; and comparative data for regions of the United States. Savings (or dissavings) were computed by subtracting the totals of farm production expenditures and family living expenditures from gross cash income.[5]

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[4] The collection of family budgetary data must inevitably have a considerable degree of error, and careful checks of the data gathered in this study indicate that the figures on income and expenditure are both biased downward. The error seems not to be distributed equally throughout all income levels, but in general is concentrated at each end of the income scale.

[5] That is, knowing two of the three variables, it is possible to calculate the third. Detailed specifications of the items included in each major component of analysis are as follows:

Gross Cash Income (Y) is made up of gross farm income of the operator plus nonfarm income of all family members and includes: (1) Value of farm products and livestock sold during 1946; (2) government agricultural payments not including dairy subsidy payments; (3) money from custom work for others; (4) wages and salaries from nonfarm work; (5) gross income of business other than farming, or profession; (6) gross income from another farm or ranch; (7) armed forces pay and allowances, excluding dependency allotments; (8) net rents and royalties; (9) net income from roomers and boarders; (10) interest, cash dividends, and income; (11)

In obtaining expenditure curves relating spending to income, family data are brought together in a frequency distribution showing, for the United States and each region, the families classified according to their gross cash incomes with corresponding expenditures. Table I presents this information by 11 class intervals. These budget data allow us to observe differences in major expenditures at one period of time among families, or groups of families, with different income levels. It does not, of course, permit analysis of fluctuations in levels of expenditures of the same families at different levels of income. To the extent that it can be assumed that with greater or less income a given income class of families would behave as does the income class above or below it, the statistical results of this cross-section study would be the same as those of a time series.

Table I shows clearly how average expenditures for family living (col. 4) and farm production (col. 3) rise consistently for the United States as average income (col. 2) increases. It also shows how average savings (col. 6) change progressively from deficits to savings with increased income.

The use being made of these variables means merely that on the average the amount spent for farm production, family living, and savings is related in some way to the gross cash income. It does not imply that gross cash income for a given year is either a dependent or independent variable, for, as will be shown later, farm family living and production appear to be "independent" of the current year's gross cash income.

The data in column 6 of Table I show that for the United States as a whole it was between those families with incomes $2,000–$2,999 (average $2,430) and those with incomes from $3,000 to $3,999 (average $3,463) that families began accumulating savings. Below that line they went constantly deeper into debt as their incomes decreased. Above that line they accumulated investments or savings.

Average income of all farm operator families in the United States was $4,330, of which $1,629 was spent for family living, $2,289 for farm pro-

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dependency allotments; (12) veterans' payments; (13) Social Security unemployment; and (14) contributions for support.

Farm Production Expenditures (X_p) include: (1) Custom work done by others; (2) wages to hired labor for farm work; (3) hire of machinery; (4) feeder cattle, sheep or lambs, and hogs; (5) other livestock; (6) poultry; (7) feed grains; (8) prepared dairy, poultry, and hog feeds; (9) salt, minerals, and tonics; (10) roughages; (11) breeding fee; (12) veterinary fees and medicines; (13) fertilizer; (14) seed; (15) processing costs; (16) spraying; (17) containers; (18) hardware; (19) irrigation water or drainage; (20) electricity; (21) costs, less trade-in allowances, for cars, trucks, tractors, other machinery; (22) licenses and insurance on machines; (23) gasoline and oil; (24) tires, batteries, repairs, etc.; (25) repairing and painting dwellings and buildings other than the farm home; (26) property taxes; (27) insurance premiums on farm buildings, machinery, and livestock; (28) interest on loans; (29) cash rent.

Family Living Expenditures (X_1) include: (1) Food and household; (2) clothing; (3) furniture and furnishings for the house; (4) medical care; (5) personal care; (6) life and accident insurance premiums; (7) newspapers, magazines, and books; (8) educational expenses; (9) amusements; (10) contributions; (11) state and federal income taxes.

Savings (X_s) is calculated by the equation $X_s = Y - (X_1 + X_p)$.

duction and $412 was saved. Income varied by region from $2,660 on the average in the South, to $8,769 in the West. Farm family living expenditures varied from $1,233 on the average in the South to $2,913 in the West, and farm production expenditures from $1,249 in the South to $4,812 in the West.

Analysis of Marginal Income

Careful study of Table I reveals that expenditures and savings tend to increase with income but at different rates. That is, farm expenditures appear to rise more rapidly with income than either family living costs or savings. This can be seen graphically in Figure 1, which is a conventional graph showing the points representing expenditures and savings at different income levels and the resulting regression lines fitted by inspection. Marginal income simply measures the proportion of each additional dollar of income spent on different items of expenditure (or savings) and is assumed to be constant over the total range of income. The regression equations for the major components in the United States farm family budget as depicted in Figure 1 are as follows:

(1) Family living (X_1) $= \$750 + .24Y$
(2) Farm production (X_p) $= -25 + .48Y$
(3) Savings (X_s) $= -700 + .28Y$

The tendency observed was for farm operators to divert 48 percent of an additional dollar of income to farm operations compared with 24 percent to family living and 28 percent to savings. Concretely these figures mean that if incomes of farm families of $5,000, which was roughly the average gross farm income in 1946, were raised to $5,100, $48 of their $100 increase in income would be spent in farm operations, while $24 would be used for family living and $28 would be saved.

From data presented in Table II it is shown that the proportion of marginal income spent for family living varies from 13 percent in the West to 30 percent in the South. This means that an increase of $100 in income at average incomes will tend to raise expenditures for family living by $30 in the South (average income $2,660) compared with only $13 in the West (average income $8,769). On the other hand, the amount expended on farm operations would vary only from $45 in the North Central ($47 in the South) to $48 in the West. Finally, whereas the average farm operator in the South would save $23 of an additional $100, the operator in the West would save $39. These figures reflect in large measure the wide difference in farm family levels of living as between West and South. The other regions generally show tendencies that fall between the extremes of West and South.

Although the marginal propensity to consume is high in the South, it is well to point out, however, that savings begin at a considerably lower

income, as will be shown in detail later. The South's customary low standard of living may well be an important factor in the South's ability to

TABLE I. AVERAGE EXPENDITURES FOR FAMILY LIVING AND FARM PRODUCTION, AND AVERAGE SAVINGS OF FARM FAMILIES BY GROSS CASH INCOME CLASS, UNITED STATES AND REGIONS, 1946

(1) Classified gross cash income	(2) Average income	Average expenditure on (3) Farm production	(4) Family living	(5) Farm production and family living	(6) Average savings (or dissavings)
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
		United States			
$ 0- 499	293	353	656	1,009	−716
500- 999	755	363	759	1,122	−367
1,000- 1,499	1,261	591	931	1,522	−261
1,500- 1,999	1,728	792	1,129	1,921	−193
2,000- 2,999	2,430	1,091	1,462	2,553	−123
3,000- 3,999	3,463	1,608	1,704	3,312	151
4,000- 4,999	4,361	2,067	1,942	4,009	352
5,000- 7,499	5,972	2,854	2,237	5,091	881
7,500- 9,999	8,519	4,202	2,566	6,768	1,751
10,000-19,999	12,890	7,745	3,025	10,770	2,120
20,000 and over	33,585	20,449	5,379	25,828	7,757
Total	4,330	2,289	1,629	3,918	412
		Northeast			
0- 499	216	451	887	1,338	−1,122
500- 999	770	593	778	1,371	−601
1,000- 1,499	1,265	900	1,000	1,900	−635
1,500- 1,999	1,758	1,279	1,246	2,525	−767
2,000- 2,999	2,529	1,124	1,840	2,964	−435
3,000- 3,999	3,639	2,242	2,004	4,246	−607
4,000- 4,999	4,288	1,925	2,206	4,131	157
5,000- 7,499	5,932	3,010	2,259	5,269	663
7,500- 9,999	8,546	5,248	2,445	7,693	853
10,000-19,999	13,084	8,323	2,858	11,181	1,903
20,000 and over	36,420	20,505	5,377	25,882	10,538
Total	5,800	3,300	2,060	5,360	440
		North Central			
0- 499	255	585	770	1,355	−1,100
500- 999	792	516	792	1,308	−516
1,000- 1,499	1,270	793	1,054	1,847	−577
1,500- 1,999	1,762	938	1,125	2,063	−301
2,000- 2,999	2,500	1,305	1,324	2,629	−129
3,000- 3,999	3,445	1,659	1,558	3,217	228
4,000- 4,999	4,382	2,188	1,883	4,071	311
5,000- 7,499	6,074	2,923	2,097	5,020	1,054
7,500- 9,999	8,598	4,067	2,562	6,629	1,969
10,000-19,999	12,962	7,417	2,807	10,224	2,738
20,000 and over	31,049	23,514	3,924	27,438	3,611
Total	5,217	2,877	1,762	4,639	578

TABLE I—*continued*

(1) Classified gross cash income	(2) Average income	Average expenditure on (3) Farm production	(4) Family living	(5) Farm production and family living	(6) Average savings (or dissavings)
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
		South			
0– 499	305	251	577	828	−523
500– 999	748	312	714	1,026	−278
1,000– 1,499	1,258	494	875	1,369	−111
1,500– 1,999	1,715	666	1,094	1,760	−45
2,000– 2,999	2,363	898	1,342	2,240	123
3,000– 3,999	3,432	1,374	1,643	3,017	415
4,000– 4,999	4,361	1,933	1,775	3,708	653
5,000– 7,499	5,731	2,583	2,244	4,827	904
7,500– 9,999	8,279	3,713	2,596	6,309	1,970
10,000–19,999	12,052	9,101	3,025	12,126	−74
20,000 and over	28,535	14,312	5,539	19,851	8,684
Total	2,660	1,249	1,233	2,482	178
		West			
0– 499	297	1,523	1,610	3,133	−2,836
500– 999	728	753	1,981	2,734	−2,006
1,000– 1,499	1,248	808	1,209	2,017	−769
1,500– 1,999	1,680	1,190	1,568	2,758	−1,078
2,000– 2,999	2,409	1,186	2,254	3,440	−1,031
3,000– 3,999	3,444	1,498	2,219	3,717	−273
4,000– 4,999	4,368	2,071	2,411	4,482	−114
5,000– 7,499	5,954	2,860	2,828	5,688	266
7,500– 9,999	8,408	4,117	2,660	6,777	1,631
10,000–19,999	13,364	6,965	3,691	10,656	2,708
20,000 and over	41,240	24,636	6,744	31,380	9,860
Total	8,769	4,812	2,913	7,725	1,044

TABLE II. PROPORTION OF MARGINAL INCOME DEVOTED TO PRODUCTION, FAMILY LIVING, AND SAVINGS, UNITED STATES AND REGIONS, 1946

	Family living expenditures	Marginal income devoted to: Farm production expenditures	All expenditures	Savings
United States	.24	.48	.72	.28
Northeast	.27	.48	.75	.25
North Central	.25	.45	.70	.30
South	.30	.47	.77	.23
West	.13	.48	.61	.39

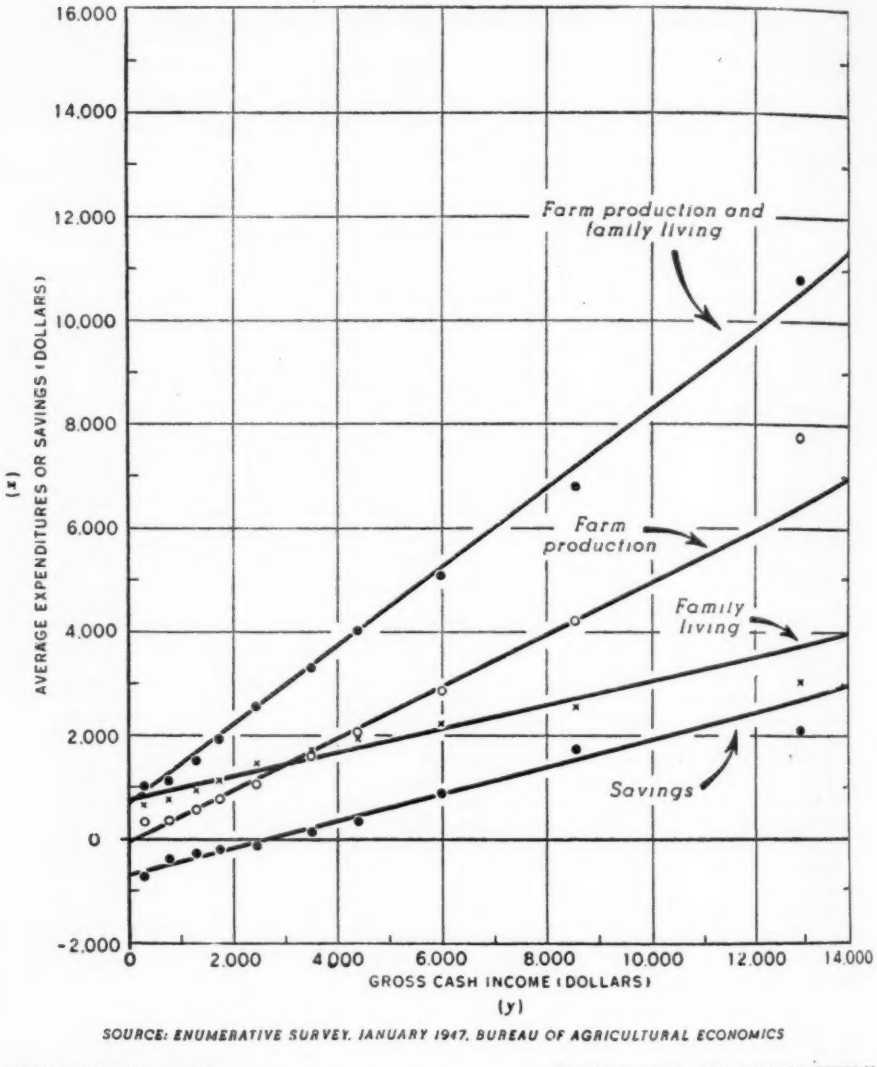

FIG. 1.—RELATIONSHIP BETWEEN AVERAGE EXPENDITURES AND SAVINGS AND GROSS CASH INCOME OF FARM FAMILIES OF THE UNITED STATES, 1946

accumulate additional capital. The success enjoyed by Farmers Home Administration in its loan program among southern farmers can be explained accordingly.

Table III shows the different tendencies that are observable in the families from income class to income class. Inter-class differences in income provide a basis for studying how families dispose of additional income at

varying income levels. It is seen that 22 percent of the additional income between the first and second income classes is devoted to family living. The proportion of additional income spent for family living increases consistently up to the class containing the income point at which savings began, which was $2,700. Thereafter, the proportion of additional income

TABLE III. INTER-CLASS DIFFERENCES IN GROSS CASH INCOME, EXPENDITURES FOR FAMILY LIVING AND FARM PRODUCTION, AND SAVINGS, UNITED STATES, 1946[a]

Gross cash income class (Dollars)	Mean	Cash income		Family living expenditures		Farm production expenditures		Savings	
		Dollars	Pct.	Dollars	Pct.	Dollars	Pct.	Dollars	Pct.
I 0– 499	293	462	100.0	103	22.3	10	2.2	349	75.5
II 500– 999	755								
II 500– 999	755	506	100.0	172	34.0	228	45.1	106	20.9
III 1,000– 1,499	1,261								
III 1,000– 1,499	1,261	467	100.0	198	42.4	201	43.0	68	14.6
IV 1,500– 1,999	1,728								
IV 1,500– 1,999	1,728	702	100.0	333	47.4	299	42.6	70	10.0
V 2,000– 2,999	2,430								
V 2,000– 2,999	2,430	1,033	100.0	242	23.4	517	50.1	274	26.5
VI 3,000– 3,999	3,463								
VI 3,000– 3,999	3,463	898	100.0	238	26.5	459	51.1	201	22.4
VII 4,000– 4,999	4,361								
VII 4,000– 4,999	4,361	1,611	100.0	295	18.3	787	48.9	529	32.8
VIII 5,000– 7,499	5,972								
VIII 5,000– 7,499	5,972	2,547	100.0	329	12.9	1,348	52.9	870	34.2
IX 7,500– 9,999	8,519								
IX 7,500– 9,999	8,519	4,371	100.0	459	10.5	3,543	81.1	369	8.4
X 10,000–19,999	12,890								
X 10,000–19,999	12,890	20,695	100.0	2,354	11.4	12,704	61.4	5,637	27.2
XI 20,000 and over	33,585								

[a] This table is based on Table I and simply shows the differences in income and expenditure between classes.

devoted to family living declines sharply to 10.5 percent between income classes $7,500–$9,999 and $10,000–$19,999. It is demonstrated therefore that the *critical point*, defined as the average income at which expenditures for both family living and farm production just equal the gross cash income, is a turning point in the decision-making process of farm families. Furthermore, it can be considered to be a culturally determined standard below which families will divert additional income to family levels of living in

increasing proportions, and above which they will divert income to farm production and savings.

The amount of dissaving decreases up to the critical point of income. Between Class I and Class II, 75.5 percent of the increase in income was translated into reduction in the amount of dissaving. Between Classes II and III, 20.9 percent of the increase in income was reflected in reduced dissaving.

Relatively little (2.2 percent) of additional income between Income Classes I and II was spent for farm production while a large part (75.5 percent) went for reduction of deficits. But between Classes II and III a relatively large proportion of additional income was spent for farm production, constituting 45.1 percent of additional money available between Classes II and III, compared with only 20.9 percent for reducing deficits. Between Income Classes II and V there was a decline in the proportion of additional income going for farm production. Income Class V, containing the breaking point, was a dividing point above which an increasing proportion of additional income went into farm production expenditures, although the tendency was not entirely consistent in all cases.

Savings tended to increase somewhat with each additional increment of income up to Class IX, and to decline thereafter. The decline in the proportion in savings was offset by the increase in the proportion spent in farm operations at the high income levels.

Cross-Section vs. Time Series Results

The preceding type of budget analysis allows a study of differences in expenditures at one time among different groups of families with different incomes. But can such cross-section results be interpreted to show what happens to family budget expenditures when family income changes over a period of time? This study yields generalizations in the above sense only if it is assumed that a typical family at income level B, when raised to level A or lowered to level C, will spend substantially as did the typical family in income levels A and C.[6] Lewis and Douglas, after studying wage-earners' budgets for 1901 and for 1918–19 and farm family budgets for 1922–24, pointed out that approximately the same results are obtained by studies both of family budgets and of annual aggregates.[7]

Regression equations computed from time series of the aggregate consumers' expenditures for the United States upon the aggregate disposable income for the period 1910–40 showed a marginal national propensity to

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[6] Such an assumption takes no account of the period of time during which the family is presumed to adjust its expenditures to income. It is, in fact, not the same family that is considered in such cross-section results.

[7] H. Gregg Lewis and Paul H. Douglas, *Studies in Consumer Expenditures*, The University of Chicago Press, 1947, p. 52.

consume of .80.[8] It will be noted that this figure is not far from the value obtained from this budget study, which gives a marginal propensity to spend of .72 by combining marginal expenditures for family living and farm production. It is significant that approximately the same results are obtained by studies of family budgets and of annual aggregates. This means that cross-section regressions comparing income and expenditures yield reasonably comparable estimates of income tendencies over time.

Further validation of this conclusion can be made by comparing the

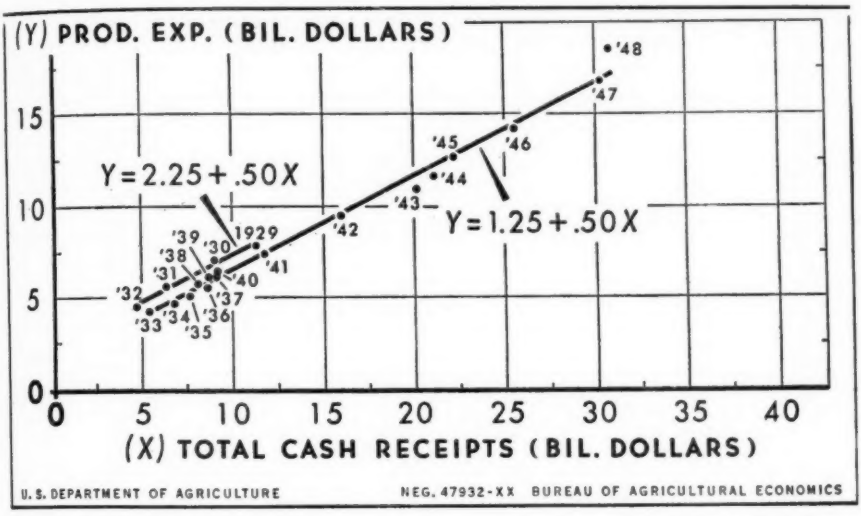

FIG. 2.—CASH RECEIPTS FROM FARMING AND FARM PRODUCTION EXPENDITURES 1929–48.

regression equation computed from time series of aggregate farm production expenditures for the United States upon the aggregate cash receipts from farming for the period 1929–48. (See Figure 2, Table IV.) Such data show a marginal national tendency to spend on farm production of .50 as compared with our budget study value of .48. It should be pointed out that the relation between the level of expenditures and receipts for the period 1929 to 1932 did not continue into the period from 1933 to 1948; instead, a shift in the relation occurred. That is, production expenditures for the same amount of receipts were generally about one billion dollars higher in the period before 1933 than in the later period. The implication of this is that farmers saved a relatively larger proportion of their income in the 1933–48 period than in the 1929–32 period. Despite the difference in the level of expenditures in the two periods, a given change in farm receipts resulted in about the same proportionate change in their expenditures for

[8] Louis J. Paradiso, "Retail Sales and Consumer Incomes," *Survey of Current Business*, XXIV, October, 1944, pp. 12–13.

each of the two periods. For example, an increase (or decrease) of one billion dollars in receipts in either period resulted on the average in an increase (or decrease) of approximately a half billion dollars in farm expenditures.

Analysis of Elasticities

Coefficient of income elasticity measures the percentage increase in specified expenditures which is associated with a given percentage increase in income, all other factors affecting the expenditure assumed to remain

TABLE IV. TOTAL CASH RECEIPTS FROM FARMING AND PRODUCTION EXPENSES OF PERSONS LIVING ON FARMS, UNITED STATES, 1929–48

Year	Total cash receipts million dollars	Production expenses million dollars
1929	11,296	7,780
1930	9,021	7,059
1931	6,371	5,634
1932	4,743	4,574
1933	5,445	4,374
1934	6,780	4,727
1935	7,659	5,111
1936	8,654	5,581
1937	9,217	6,126
1938	8,168	5,744
1939	8,684	6,088
1940	9,130	6,484
1941	11,767	7,469
1942	16,069	9,465
1943	20,106	10,882
1944	21,164	11,640
1945	22,289	12,629
1946	25,636	14,238
1947	30,328	16,849
1948	30,802	18,556

Source: *Agricultural Statistics* 1949. U. S. Dept. of Agr. Table 677, page 627 and Table 681, page 633.

constant.[9] For example, if income of farm families rises 10 percent and is associated with a rise of 10 percent in expenditures, then the income elasticity for that expenditure item is unity (1.00) and this expenditure item is said to show a marked degree of income elasticity. An item with an income elasticity of less than 1.00 may be classified as "rigid," since it is relatively insensitive to changes in income. An item having a coefficient greater than 1.00 may be classified as "sensitive," since the proportion spent for the item is greater than the proportionate change in income.

Turning to the income elasticity of family living, it will be seen from Figure 3 that all farm families in 1946 had a coefficient of .54 for family

[9] Income elasticity is: The slope of the line fitted by inspection to the points plotted on double-logarithmic paper representing the average expenditures by gross cash income. In this case it is assumed to be constant over the entire range of income.

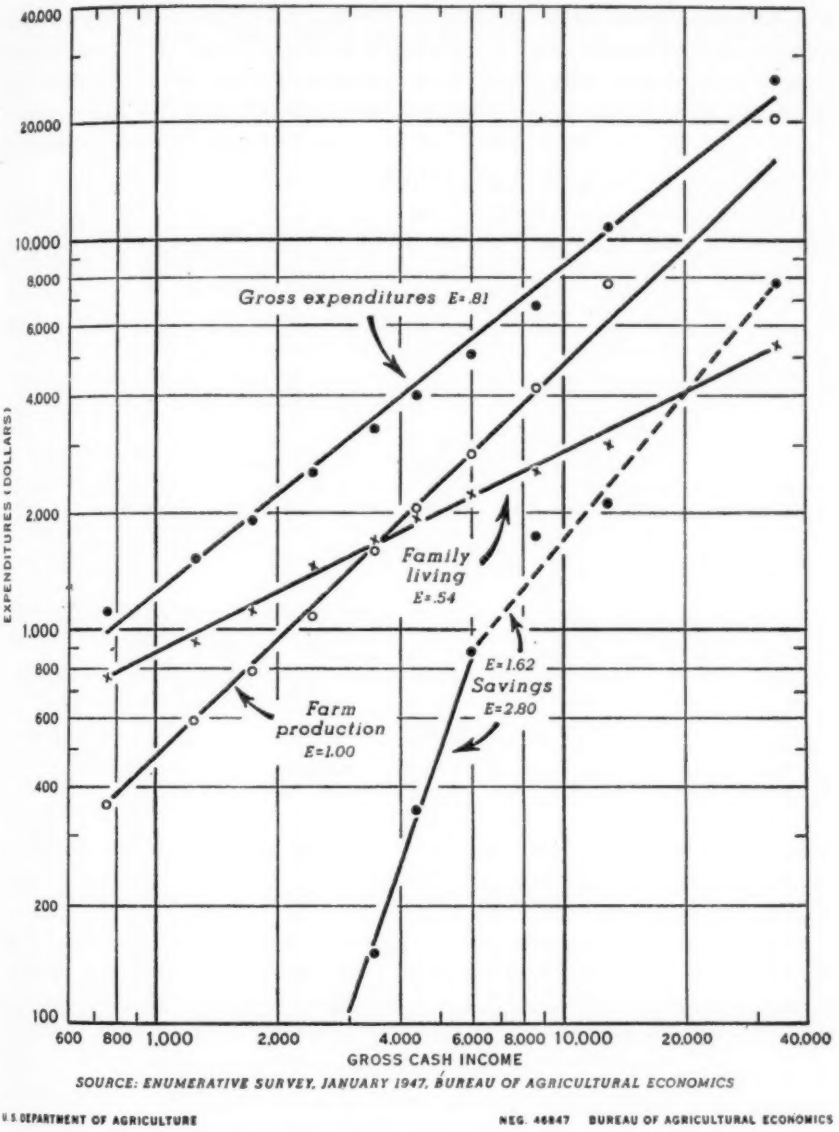

FIG. 3.—FARM FAMILY LIVING EXPENDITURES, FARM PRODUCTION COSTS, AND SAVINGS RELATED TO INCOME, UNITED STATES, 1946, WITH ELASTICITIES.

living expenditures, which was 46 points less than the coefficient of 1.00 for farm production. Savings tended to increase even more rapidly than farm production expenditures. The coefficients of income elasticity of savings were approximately 2.80 in the income range $3,000 to $6,000 and 1.62 above $6,000.

The implications of these data are that an increase of 10.0 percent in family income results, on the average, in an increase of 5.4 percent in family living expenditures, 10 percent in farm production costs, and from 16 to 28 percent in savings. (Some consideration will be given later to differences between the whole range of incomes and comparative elasticities above and below the critical point at which savings begin.)

The coefficients of elasticity of income upon farm family living, production, and savings by regions are presented in Table V. Elasticities of family living expenditures were appreciably less than unity in all regions. Only

TABLE V. COEFFICIENTS OF ELASTICITY OF INCOME UPON FAMILY LIVING, FARM PRODUCTION, AND SAVINGS OF FARM FAMILIES, UNITED STATES AND REGIONS, 1946

	Elasticity of income upon:			
	Family living	Farm production	Total expenditures	Savings
United States	.54	1.00	.81	(2.80 ($2,500–6,000) (1.62 (Over $6,000)
Northeast	.49	1.00	.75	2.00 (Entire range)
North Central	.45	1.00	.75	(2.25 ($3,000–9,000) (1.25 (Over $9,000)
South	.59	1.00	.92	(2.25 ($2,000–9,000) (1.50 (Over $9,000)
West	.47	1.00	.74	(2.75 ($3,000–9,000) (1.50 (Over $9,000)

four points separated the coefficients of family living expenditure of the Northeast, North Central, and West regions (.45–.49), while the South had the highest coefficient (.59).

On the other hand, farm production expenditures have a coefficient of income elasticity of unity in each of the four regions. That is to say, expenditures on farm production increase as rapidly proportionately as gross cash income generally throughout the country. But savings, with coefficients of income elasticity well above unity, increase proportionately more than income in all regions. The savings function for United States farm families is best described by two regression lines, and the coefficient of income elasticity for savings is estimated at 2.80 for the income range $2,500 to $6,000, and 1.62 for incomes above $6,000.

If expenditures for family living and farm production are combined, the coefficient of income elasticity for total expenditure is found to be .81.[10]

[10] It is of interest that Cheng-Hsien Wang estimated the income elasticity of farmers' key expenditures as a whole to be 0.8, using the annual estimates made by the Bureau of Agricultural Economics for the period 1920–40. This calculation was reported in "A Note

Paradiso fitted a logarithmic function to data on total annual incomes and total consumption of the general population of the United States by years for the period 1929–42 and found that the coefficient of income elasticity to total consumption was .80, which is about the same value obtained in this study.[11]

Analysis of Proportional Expenditure

It is customary in most budget analyses simply to compute the proportion of income spent for various components of expenditure. This was the method used by Ernest Engel in his pioneer statistical studies of family income and expenditures. Proportional expenditure measures the proportion of gross cash income which is spent on the major items of expenditure.

Farm families do increase expenditures on family living when income

TABLE VI. RATIO OF AVERAGE EXPENDITURES AND SAVINGS TO AVERAGE GROSS CASH INCOME OF FARM FAMILIES, UNITED STATES, 1946

Classified gross cash income	Ratio of specified item of expenditures to income			Ratio of savings (or debt) to income
	Farm production	Family living	Farm production and family living	
0– 499	1.20	2.24	3.44	−2.44
500– 999	.48	1.01	1.48	−.49
1,000– 1,499	.47	.74	1.21	−.21
1,500– 1,999	.46	.65	1.11	−.11
2,000– 2,999	.45	.60	1.05	−.05
3,000– 3,999	.46	.49	.96	.04
4,000– 4,999	.47	.45	.92	.08
5,000– 7,499	.48	.37	.85	.15
7,500– 9,999	.49	.30	.79	.21
10,000–19,999	.60	.23	.84	.16
20,000 and over	.61	.16	.77	.23
Total	.53	.37	.90	.10

increases, but not by so much as income. Table VI shows that, on the average, a smaller proportion of income is spent for family living as income increases. The ratio of family living expenditures to gross cash income fell from 224 percent in the lowest income bracket to 16 percent in the highest incomes.

In contrast to the generally declining ratio of family living expenditures and income, Table VI shows that farm production expenditures on the average represent a fairly constant proportion of gross cash income over most of the income range. The proportion fell at first from 120 percent in the

on Farmers' Consumption and Its Stabilizing Nature," *The Review of Economics and Statistics*, Vol. XXXII. No. 3, August, 1950, p. 255. Wang's article appeared subsequent to the completion of this study.

[11] "Classification of Consumer Expenditures by Income Elasticities," *Survey of Current Business*, XXV, January 1945, pp. 8–9.

lowest income bracket to 45 percent in the $2,000–$3,000 income class, increasing thereafter to 61 percent in the highest income class.

On the average, there were no positive savings below $3,000 gross cash income, and the ratio of savings to income rose from four percent in the income class $3,000 to $4,000, to 23 percent in the highest income bracket.

Another basis of comparison is to take arbitrarily selected income classes and to calculate their respective income expenditure ratios. Table VII summarizes such data relating to three income classes for the United States and Regions.

TABLE VII. COMPARATIVE DATA ON EXPENDITURES AND INCOME AT LOW, MEDIUM AND HIGH INCOMES FOR FARM FAMILIES, UNITED STATES AND REGIONS, 1946

	Proportion of gross cash income devoted to		
	Production	Family living	Savings
	Percent	*Percent*	*Percent*
LOW INCOME ($1,000–$1,499)			
United States	47	74	−21
Northeast	71	79	−50
North Central	62	83	−45
South	89	70	−9
West	65	97	−62
MIDDLE INCOME ($4,000–$4,999)			
United States	47	45	8
Northeast	45	51	4
North Central	50	43	7
South	44	41	15
West	47	55	−3
HIGH INCOME ($7,500–$9,999)			
United States	49	30	21
Northeast	61	29	10
North Central	47	30	23
South	45	31	24
West	49	32	19

What appears from this table is that all low-income families, regardless of region, spent more for family living than they did for farm production, and their savings were negative in all regions. Even for the middle-income group, farm family living expenditures were predominant in the West and Northeast. However, in high-income groups farm production costs were dominant in all regions and savings were positive, varying from a tenth of income in the Northeast to about a fourth in the South.

High-income families had about the same proportion of their total income devoted to family living the country over, varying only from 29 percent in the Northeast to 32 percent in the West. In sharp contrast, family living among low-income families varied widely from 70 percent of total income in the South to 97 percent in the West, giving further evidence of the lower standards of living of the South in comparison with the West.

When we consider farm production expenditures, particularly in regard to low-income families, marked variations between regions are apparent. Low-income families in the South spent only 39 percent of their income on farm production compared with 71 percent in the Northeast. At the middle-income level, the South again was lowest of all regions, farm expenses comprising 44 percent of income as compared with 50 percent in the North Central Region. At the high-income level, the South, although lowest in proportion of income spent on production (.45), was not far under the figures for the North Central Region (.47) and the West (.49) but markedly different from the Northeast (.61). The variations in the proportion of income spent for farm production are indicative, in part, of the wide regional variation in size of farming operations associated with any given income, especially with low incomes. Since the income concept used in this study includes both farm and nonfarm income, the results obtained here are undoubtedly due to the relatively high incidence of farm underemployment in the South, which forces the farmer and his family to go into nonfarm employment to supplement the family income.

Turning now to savings, wide variation is found by regions at specified income levels. Low-income farm families on the average did not save in any region in 1946. However, middle-income families had savings in all regions except the West. Farm families in the South saved a larger proportion of their incomes (15 percent) at the middle-income class than did families in the Northeast or North Central States. High-income farmers of all regions saved some money. In the South they saved 24 percent of their incomes compared with 10 percent in the Northeast. That is, their delayed desires for higher levels of living were not so great and their levels of aspiration (standards) not so high.

As can be seen from these facts, there are marked variations in level of living expenditures among families in the same income classes, when such classes are measured in terms of each having the same amount of gross cash income. How great these differences are is revealed by data presented in Table I. The data show, for instance, that farm families in the South with incomes below $500 spent only $577 on living and only $251 on production, while this same income group in the West spent $1,610 on living and $1,523 on production. Families in the South went into debt only $523 while those in the West went into debt $2,836. The same differential in expenditure behavior maintained in these regions for the $500–$999 gross income class.

These and other wide variations apparently result from the fact that, measured in terms of gross cash income, the sums $500, $1,000, and $5,000 do not mean the same in terms of patterns of living in the two regions. By taking the "critical point" in expenditure patterns as the point around which families can be classified as low, medium, and high-income groups, it is possible to approximate standardization of these classes.

It will be remembered that the critical point is the point on the income scale at which expenditures just equal income. Savings are negative below this point and positive above. On the average, farm families in 1946 began to save at approximately $2,700 gross cash income, but farm families in the South have a point at which savings begin of $1,900, which is considerably under the national figure. This is to be compared with $3,000 in the North Central region, $4,400 in the Northeast, and $4,900 in the West.

The purpose of standardization is to see if the critical points in all cases are dividing points around which similar patterns or tendencies are observable in the budgetary behavior of farm families. In order to test this, it is necessary to look at the tendencies in expenditures fo family living and farm operations in relation to the critical point. Such an examination based upon the preceding analyses shows that:

1. Family living expenditures accelerate quite consistently up to and in some cases one income interval above the critical points, and then decrease in percent of total expenditures.
2. Production expenditures are less than family living costs up to the critical point in income, and in some cases one or two income classes above that, but in all cases do not increase until deceleration in family living expenditures occurs. (See Table VIII.)

TABLE VIII. FAMILY LIVING EXPENDITURES AS A PERCENT OF FARM PRODUCTION EXPENDITURES BY INCOME, UNITED STATES AND REGIONS, 1946

Classified gross cash income (Dollars)	Family living expenditures in percent of farm production expenditures				
	United States	*N.E.*	*N.C.*	*South*	*West*
0– 499	186	197	132	230	106
500– 999	209	131	153	229	263
1,000– 1,499	158	111	133	177	150
1,500– 1,999	143	97	120	164	132
2,000– 2,999	134	164	101	149	190
3,000– 3,999	106	89	94	120	148
4,000– 4,999	94	115	86	92	116
5,000– 7,499	78	75	72	87	99
7,500– 9,999	61	47	63	70	65
10,000–19,999	39	34	38	33	53
20,000 and over	26	26	17	39	27
Total	71	62	61	99	61

Interpreting this critical point analysis in socio-economic terms and taking cognizance of the relatively rigid nature of family living expenditures in relation to income, the following hypotheses may be posited:

1. The rigidity of family living costs is due to actual physical need for such basic items as food, clothing, and shelter, and to standards of

living (i.e. levels of living desired) which are set by their consumption habits. This differs for the people of various regions.

2. It is a reasonable expectation that the relatively imperious demands for consumption goods and services would be alleviated and expenditures for them would decline, once families had sufficient income to meet more or less their own and their community's standard of living.
3. If the above two assumptions are correct, it is to be expected that expenditures for living would not so greatly influence expenditures for production after the family's income was sufficient to assure its standard of living.

To test this hypothesis, it is necessary to know in much more detail than the present data allow just how farm families make decisions around the critical point where the decision-making process would seem to be clearcut, between the welfare of the farm family and farm production.[12] A study of families forced to decisions by the imperatives of living on the one hand and production for the market on the other (with a modicum of income) should reveal many things about the socio-psychological factors in behavior of American farmers.

The analysis presented here does not explain why the level of living to which farm families are accustomed is a *standard* of living which they tend to maintain. It indicates only that this tendency is so strong that it greatly influences investments and savings, and to a considerable degree expenditures for production. As such, it influences the operation of the total agricultural enterprise of the country. An explanation of the causes of the rigidity in family living expenditures would fall in the fields of socio-psychological and cultural analyses. In the light of what this study has indicated, such analyses are essential to an understanding of the economic as well as the social behavior of farm families.

[12] The size of the sample in this study (4,057 farm operator families) is too small to allow more refined analysis within relatively narrow ranges of income around the critical point. Future research should be based upon a study design which includes adequate coverage of families who are living under conditions close to the point where decision-making between family living and farm operations is thrown into sharp focus by the imperatives of each component. Any statistical analysis should be supplemented with case studies of families with incomes approximating the critical point of income who are by that fact more acutely aware of the competitive force of the three major components of farm life-family living, farm production and savings or capital accumulation.

PRICE EXPECTATIONS AND REACTIONS TO UNCERTAINTY BY FARMERS IN ILLINOIS*

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IN RECENT years the attention of farm management economists has been drawn to a field relatively unexplored by research workers. This field covers the decisions made by farmers under conditions when the decisions relate to production ventures the outcomes of which are not known with certainty. The most important phases of this uncertainty are associated with the passing of time and include weather, insects and diseases, and cost and price variations, as well as more personal aspects such as length of life, health, and, in more recent times, institutional factors such as the chances of being subjected to economic controls.

Relatively little has been done to determine how farmers, in the dim light of their imperfect knowledge, actually formulate their decisions in response to changes inherent in the economic environment in which they operate. The progress made in developing concepts and theories has far outpaced the ability or the willingness of investigators to determine by empirical research the usefulness of these theories in interpreting observed events in agriculture.

The economic variables which link successive time periods are the attitudes and the expectations of farmers, and the entrepreneurial decisions and acts which are motivated by them. These attitudes, decisions, and acts influence the position attained by the firm in later periods of time. It is suggested that farm management research workers, as applied economists, should accept the challenge to include this aspect of farming in their own sphere of responsibilities.

Aims of the Survey

The survey to be described centered around three main issues:

I. The nature of farmers' price expectations.
Questions were asked as to what single price the farmer considered to be most probable, what range of price he considered might occur, and whether or not he believed the price more likely to be nearer

* This paper is a summary of results included in a dissertation presented in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Agricultural Economics at the University of Illinois. Professors H. C. M. Case and J. E. Wills were my advisers and their criticisms and assistance added much to the value of the results. Professors F. Modigliani and R. Ferber also assisted in planning the survey. Responsibility for errors and omissions remains mine. The study was made at the University of Illinois during my tenure on the T. L. Pawlett Scholarship, University of Sydney, Australia, and the C. H. Booth Fellowship at the University of Illinois.

to one extreme than the other within the range. A question was included to ascertain what factors the farmer considered in formulating these expectations.

II. Farmers' uncertainty premiums for corn.
Questions were designed to determine the relationship between (1) the forward price per bushel at which a farmer would contract in March to sell his 1950 corn crop, apart from corn to be fed; and (2) the price which he expected corn to be in December. The comparison was complicated by the corn price support program and government acreage allotments.

III. Risk and uncertainty preferences of farmers.
Questions related to the farmer's attitude toward a certain return in comparison with an alternative of an uncertain situation in which returns might be 50 percent above or 50 percent below the certain return. This section was designed to ascertain the attitude of farmers toward risk and uncertainty. Questions were asked relating to tenure, age, capital invested, education, and other social and economic influences. These were considered to warrant study to ascertain whether or not they were associated with differences in the uncertainty characteristics of farmers.

It was necessary to define carefully these farmers to be included in the investigations relating to the expectations of farmers. It was decided to include all persons living in houses in the sections chosen in the sample, who *had entrepreneurial decisions to make*, or who *had an active influence in the decisions made on one or more farms.*

This implies that farmers who were not actual farm operators (in particular, landlords, including three women) living in houses in the sections chosen were included, in recognition of the influence of such persons in the decisions made on farms.

Field work on the survey extended from March 29 to April 25, 1950. The survey was restricted to the cash grain area of Illinois, defined by type-of-farming-area 4a.[1] The sampling procedure used was an area cluster method.[2] Farms were surveyed in clusters of eight, and 20 clusters were included, making 161 farmers in the sample. Of the 176 farmers approached, 13 refused outright to respond when the purpose of the study was first outlined, mainly on the basis that "I can't spare the time." Two farmers refused to proceed after the questioning was actually under way.[3]

[1] H. C. M. Case and K. H. Myers, *Types of Farming in Illinois: An Analysis of Differences by Areas*, Illinois Agricultural Experiment Station Bulletin 403, 1934.

[2] Sections within townships were chosen at random, and all farmers encountered were included.

[3] The two farmers refused to proceed when the sure-chance questions were asked because of a fear that some detrimental use would be made of the answers. Despite clear explanations to the contrary, they believed that some form of government "check-up" was involved.

Nature of Price Expectations

A. *Corn.* Of 161 farmers interviewed, 134 stated expectations in terms of a single price, either with or without a range of expected prices as well. A tabulation of results is presented in Table I.

TABLE I. CORN PRICE EXPECTATIONS: NATURE OF EXPECTATIONS

Nature of expectation	Number of farmers	Example of expectation.	
		Single price	Range
Single value—no range	7	$1.10	—
—at top of range	21	$1.10	$.90–1.10
—mid range	87	$1.10	$.90–1.25
—at bottom of range	19	$1.10	$1.10–1.35
Range only	24	—	$.90–1.25
Expressed in relation to support price	1	—	15 cents less than support price
No cardinal expectation	2		
Total	161		

Farmers often expressed the belief that what they thought individually was of little significance. Many believed that it was too early to attempt to predict prices at the time of planting because:[4]

Farmer: "It all depends on what sort of a crop we get."

Interviewer: "Well, what sort of a crop will you get?"

Farmer: "Depends on the weather, and the corn borer, and how many fit into the allotments."

Interviewer: "Yes, but you have some idea of a most likely price—let's see, do you reckon on a good or a bad year?"

Farmer: "Well, the corn borers'll cause damage, and we're due for a drought. We had a wet winter, and we've had two good seasons."

Interviewer: "So you reckon the price will be about what?"

Farmer: "Aw, about a dollar and a quarter."

Interviewer: "Would you like to put a top and a bottom on that?"

Farmer: "Well, it won't go above the sealing[5] price—say, a dollar thirty-five."

Interviewer: "What about a bottom?"

Farmer: "Well, the government won't let it fall below a dollar. This is election year, you know."

Interviewer: "Do you reckon that the price is more likely to be nearer a dollar thirty-five or nearer a dollar?"

Farmer: "Nearer the dollar thirty-five."

The existence of a most probable price at the upper or lower limit of

[4] The interview records statements of a farmer typical of those who had not consciously formed precise price expectations before the question was raised in the interview. It also records the importance of noting carefully that the expectations of farmers relating to prices were not always so precisely formulated in the farmer's mind as the single statistic used to describe it would suggest. The tendency to round off the expectations to the nearest quarter of a dollar will be referred to below.

[5] Sealing or support price refers to the rate at which the Commodity Credit Corporation is willing to lend farmers on the security of corn sealed under approved storage arrangements.

the range was often explored further during the interviews. The replies reflected a strong conviction regarding the influence of the government. Those who figured that the most likely price was at the lower limit of the range of expected prices believed that a large or average crop would be more likely than a small crop, and that this new crop, plus the large stocks of corn on hand, would tend to reduce corn prices to a low level. This low level might be kept higher than it would otherwise be by the government support program. Other farmers believed a short crop more likely and that prices would more likely be nearer the top of the range. But prices would not rise above government support level, they believed, whatever that might be.

In each case, the upper and lower extremes of the farmer's range of expected prices were sheared off from the probable range by the presence of the government program. Some of these farmers might well express single most probable prices in the middle of ranges if the government program were not in force.

In other cases, farmers indicated that they had in mind two sets of conditions which might arise, depending on whether there was a short or long crop. The range was the range of prices which would exist under these (mutually exclusive) alternatives, and the most probable single price was the measure of central tendency of whichever of the two alternative frequency distributions the farmer considered more likely. The fact that similar kinds of expectations were also obtained for hogs and beef cattle suggests that this second explanation may be more important than the first listed above.

If attention is concentrated on the 134 farmers who expressed single value anticipations, it is found that the range of expected prices is from 75 cents to $1.55. The mode is $1.00.[6] The results are presented in Table II.

Examination of Table II reveals that there is a strong tendency for farmers to round off expectations on prices such as $1.00 and $1.25. Note, for example, the two farmers expecting a price of 95 cents compared with the eight farmers at 90 cents and the 56 farmers at $1.00. If the data are grouped in a manner designed to remove this influence, and if all prices around $1.00 and $1.25 respectively are considered as equal expectations, the grouped results presented in Table II are obtained. The midpoint values of the four classes are then 75 cents, $1.00, $1.25 and $1.50.

In the course of conversation with farmers, the interviewer gained a strong impression that they formed expectations of the price of corn in December, 1950, by using the price in December, 1949, or at the time of the survey, as a base on which to superimpose the effects of expected events. The large stocks of corn already on hand were an added influence. A comparison of weighted means of long- and short-term prices with the expec-

[6] The actual price for No. 2 yellow corn in Chicago, December 1, 1950, was $1.65.

tations of farmers showed that the statistical averages which gave heavy weighting to prices in the immediate past were the closest approximation to the expected prices for corn and soybeans.

B. *Price Ratios.* The farmers who indicated expectations for both corn

TABLE II. CORN PRICE EXPECTATIONS: FREQUENCY DISTRIBUTION OF SINGLE VALUE EXPECTATIONS

Original data		Grouped data	
Price expected	Number of farmers	Price expected	Number of farmers
Cents		*Cents*	
75	4	62.6– 87.5	16
80	5	87.6–112.5	79
85	7	112.6–137.5	36
90	8	137.6–162.5	3
95	2		
100	56	Total	134
105	2		
110	11		
115	10		
120	8		
125	13		
130	1		
135	4		
140	1		
145	—		
150	1		
155	1		
Total	134		

TABLE III. RELATIONSHIP BETWEEN RATIO OF EXPECTED CORN AND SOYBEAN PRICES AND PLANS OF FARMERS REGARDING THE GOVERNMENT CORN ALLOTMENT PROGRAM

Ratio of expected corn and soybean prices	Farmers who intend:		
	to conform to allotment	*not* to conform to allotment	
			Total
.555 or below (i.e., relatively low corn price)	23	18	41
Above .555 (i.e., relatively high corn price)	38	11	49
	61	29	90

Chi square, $X^2=4.70$, and $P<.05$

and soybeans numbered 108; of these, 90 had plans regarding the allotments at the time of the survey. The mean of the ratios between the expected corn and soybean price for these 90 farmers was .555. In Table III, these 90 farmers have been classified on the basis of whether or not they intend to conform to the allotment, and whether the ratio of their expected corn and soybean prices is below or above .555. This two-way

classification was then tested by use of the chi square (X^2) test. The test showed that there was a significant association between the two bases of classification at the five percent level of significance.

The statistical test confirms that those farmers who expected corn prices to be low relative to soybean prices tend also to be those who do not intend to conform to the corn acreage allotments.[7] Conversely, those farmers who considered the ratio to be higher, i.e., the corn price to be high relative to the soybean price, were more inclined to be those farmers who intended to remain within the corn acreages prescribed by the government program. This result suggests that once a farmer has decided to conform to the reduced corn acreage allotment, he tends to induce from that a broad conclusion that the majority of others will do likewise, which will tend to keep the corn price higher than it would otherwise be.[8]

TABLE IV. CORRELATION BETWEEN PRICES EXPECTED BY INDIVIDUAL FARMERS FOR FOUR COMMODITIES

Commodities	Number of farmers	Correlation coefficient*	Standard error of correlation coefficient
Corn-hogs	100	0.242	0.094
Corn-beef cattle	69	0.000	0.121
Corn-soybeans	108	0.199	0.092
Soybeans-beef cattle	64	0.292	0.114
Soybeans-hogs	89	0.263	0.099
Hogs-beef cattle	68	0.249	0.114

* The coefficients are adjusted for the number of observations to indicate the values which are most probably true for the universe from which the sample was drawn. Hence the adjusted reading of 0.000 for corn-beef cattle. See M. Ezekiel, *Methods of Correlation Analysis*, New York: John Wiley & Sons, Inc., 1941, p. 142.

An analysis of the relationships between the expected prices of corn, soybeans, hogs and beef cattle has been made, the results being presented in Table IV. In each case, the pairs of expectations expressed by farmers were considered separately, and a coefficient of correlation prepared for the paired combinations. As not all farmers indicated expectations for all commodities, the number included in each correlation analysis varies.

[7] The analysis is subject to one factor, the influence of which cannot be accurately estimated. In a minority of cases among tenant farmers, the decision to remain in the allotment was made by the landlord. In others it was a joint decision by the landlord and tenant. In these latter cases it was found impracticable to make a distinction between the tenant's preference and the ultimate decision, as the tenant himself was not always clear in his own mind as to what choice he would have made had the choice been his alone.

Decisions not to remain in the allotment also depended in some cases on the abnormally high winter killing of clover stands, which meant that the land had to be resceded, often to corn or soybeans. In some cases soil erosion hazards tended to discourage planting of soybeans, hence influenced the farmer's willingness to reduce his corn acreage.

[8] This tendency on the part of farmers to generalize from their own personal experiences was a very strong subjective impression obtained in the field interviews. It applied to losses of spring hogs in particular; farmers experiencing such losses tended to generalize these experiences on a wider scale than the boundary of their own farms.

The results relate to the selectivity displayed by farmers in their individual commodity price expectations. A high correlation would have led to the conclusion that farmers tend to consider commodities together, prices being expected to rise or fall for all commodities in a uniform way. It appears that farmers consider each commodity separately when formulating expectations, though the tendency to round off price expectations may mask any correlation which exists. Nevertheless, the evidence is in

TABLE V. FREQUENCY DISTRIBUTION OF FARMERS ACCORDING TO THEIR EXPECTED HOG-CORN AND BEEF CATTLE-CORN PRICE RATIOS

Hog-corn ratio		Beef cattle-corn ratio	
Ratio of expected prices	Number of farmers	Ratio of expected prices	Number of farmers
7– 7.99	1	14–14.99	1
8– 8.99	—	15–15.99	—
9– 9.99	—	16–16.99	1
10–10.99	1	17–17.99	1
11–11.99	7	18–18.99	1
12–12.99	25	19–19.99	—
13–13.99	12	20–20.99	7
14–14.99	22	21–21.99	3
15–15.99	19	22–22.99	8
16–16.99	4	23–23.99	1
17–17.99	4	24–24.99	3
18–18.99	2	25–25.99	15
19–19.99	—	26–26.99	6
20–20.99	1	27–27.99	1
21–21.99	—	28–28.99	4
22–22.99	2	29–29.99	3
	—	30–30.99	4
Total	100	31–31.99	3
		32–32.99	1
		33–33.99	1
		34–34.99	1
		35–35.99	1
		36–36.99	—
		37–37.99	—
		38–38.99	1
		39–39.99	—
		40–40.99	2
			—
		Total	69

support of the proposition that farmers do formulate expectations for particular commodities separately.

An analysis was also made of the expectations of farmers in terms of the hog-corn and beef cattle-corn ratio.[9] The corn and hog prices expected by each farmer were converted to a single ratio, and results of this conversion are presented in Table V.

The analysis of these ratios showed that the coefficient of variation for the ratio was greater than the coefficient of variation for the expected

[9] The number of bushels of corn equal in value to 100 pounds of hogs or beef cattle. The actual ratios, in Chicago, December 1, 1950, were hog-corn, 11.15; beef cattle-corn, 20.45.

prices of hogs and corn in one case, and of beef cattle and corn in the other. Table VI indicates that the variation in the ratios around the mean value exceeds the variation in the expected prices of the actual commodities.

TABLE VI. EXPECTED PRICES: COEFFICIENTS OF VARIATION OF PRICES EXPECTED AND OF RATIOS OF PRICES EXPECTED

Commodities	Mean expected price or ratio	Standard deviation	Coefficient of variation
Corn*	103.90	14.467	.139
Hogs	14.29	1.675	.117
Hog-corn ratio	13.96	2.258	.162
Corn*	105.43	16.235	.154
Beef cattle	26.55	3.636	.137
Beef cattle-corn ratio	25.73	5.103	.198

* The number of farmers expressing expectations of prices for hogs or beef cattle varied, so that the number of farmers in each ratio varies. See Table V for numbers of farmers in each group.

In this analysis there is no comparison of a particular farmer's expectations for different products; expectations by individual farmers for each commodity or ratio are compared with the mean expectation of all farmers for each price or ratio.

Farmers' Uncertainty Premiums for Corn

A series of questions centered on the farmer's attitude toward an opportunity to remove risk of price fluctuations by making a contract to sell his corn at the time of the survey rather than at harvest time. It was necessary to emphasize to farmers that the contract would pay a price per bushel, but would be signed on an acreage basis. Whatever the number of bushels of corn were produced, they could be sold at the contract price.

The farmer's stated contract price was adjusted to make it comparable with the Chicago price which he had stated that he expected in December 1950. This adjustment varied with localities, and was based on published estimates of freight differentials between counties visited and Chicago. To this freight charge was added a country elevator's charge and commission.[10]

For those farmers *not* in the allotment this year, a comparison between the price at which the farmer would contract and his estimate of the Chicago price, *less* the locality differential, gave the estimate of his uncertainty premium.

In the case of farmers planning to remain in the government allotment program in 1950, an alternative opportunity to dispose of their corn existed.

[10] The estimates were based on freight locality differentials as recorded by L. J. Norton, in "Developments in the Transportation of Illinois Grain," University of Illinois College of Agriculture, Mimeo AE.2618, March, 1949. The deductions from the Chicago price made in each county were made up of freight and one cent commission and three cents country elevator charge per bushel.

This was to store the corn under the government loan program. Conversations with farmers made it clear that they did not consider the storage of corn under government seal a costless process. In particular, awareness of the risk that the corn crib would not be vacated in time to allow the following crop to be harvested at the optimum time was prevalent in the farmer's mind. In order to make an adjustment for this cost, a deduction of 15 cents per bushel was made.[11]

In order to make the procedure clear, an example is presented in Table VII of the calculation of the uncertainty premium for a farmer who remains in the corn allotment and who is therefore eligible to seal corn under the government loan program.

TABLE VII. CALCULATION OF UNCERTAINTY PREMIUM FOR A FARMER IN THE ALLOTMENT

	Dollars per bushel
Data available:	
Expected corn price, December 1, Chicago	1.15
Expected support price for corn	1.35
Price at which farmer would contract to sell the corn which he now intends to sell or seal	1.40
Adjustment of data:	
Conversion of expected price in Chicago to farm price: $1.15 less (say) 13 cents locality differential=	1.02
Deduction of costs of sealing from expected support price: $1.35 less (say) 15 cents=	1.20
Uncertainty premium:	
Expected return from corn *less* contract price: $1.20–$1.40= –20 cents.	

The higher of the two adjusted prices, $1.20 (the expected returns from sealing the corn) was used as the figure from which to deduct the price at which the farmer would contract to sell in the spring.

The estimates for farmers in and those not in the allotment program have been presented separately in Table VIII. Those farmers as yet undecided have been included in the allotment group, as they reckoned on a support price in excess of the price they expected to prevail in Chicago; their inclusion in the allotment group is more realistic since, in stating the price at which they would contract, they considered that they could fit into the allotment as an alternative to the contract if they so desired. Farmers not in the allotment had no such choice in mind, having decided not to restrict their corn acreage in 1950 to comply with the acreage restrictions.

While the estimates are approximate, owing to the arbitrary nature of the deductions for locality differentials and for costs of sealing, the important

[11] This was based on estimates of costs of sealing under the government loan program and included a liberal estimate of costs incurred by sealing. The costs involved are risks of damage, rattage and invisible loss, wear and tear on corn crib, risk of loss if crib is not vacated in time, risk of shrinkage, and the "loss" if corn is on hand when taxes are levied on April 1. This tax varies from one to three cents per bushel.

result shown is a strong reference not to contract in advance despite the accompanying price guarantee and stability. The conclusion that uncertainty premiums as measured in this study are negative for farmers not in the allotment is indisputable. The same conclusion relating to farmers in the allotment may be made if the deduction for sealing costs is included.

TABLE VIII. FREQUENCY DISTRIBUTION OF FARMERS' ESTIMATED UNCERTAINTY PREMIUMS[a] RELATING TO CORN

Premium	Farmers in allotment	Farmers *not* in allotment	
(cents per bushel)			
Would not contract at all	11	5	
−115	1	—	
—	—	—	
—	—	—	
—	—	—	
−75	—	1	
−70	—	—	
−65	—	1	
−60	—	3	
−55	1	3	
−50	1	2	
−45	1	1	
−40	1	9	
−33	6	1	
−30	7	1	
−25	9	4	
−20	7	1	
−15	23	6	
−10	11	—	
−5	10	1	
0	5	—	
5	2	—	
10	3	—	
15	1	—	
Total	100	39	
Insufficient data to enable premium to be calculated	15	7	
	115	46	161

[a] A positive uncertainty premium implies that a farmer is willing to sell under contract at less than his most probable expected price. A negative uncertainty premium indicates that a farmer would contract only at a price higher than his stated single most probable expected price.

The nature of the uncertainty premiums of those farmers not in the allotment is made more evident by a comparison of the *upper limit* of the stated expected price range and the price at which the farmer would contract. The upper limits of the expected price range were adjusted to a farm price by deducting the appropriate locality differential from the expected Chicago price. In the majority of cases, 25 of the 33 farmers concerned, the farmers would contract only for a price in excess of the upper limit of their expected range. Two factors are involved. First, there is a suggestion that the range of expected prices indicated by farmers does not include all of

the prices which the farmer considered might possibly occur. Secondly, if the price range can be accepted as the limit of "reasonable likelihood," the result confirms the conclusion already recorded, that farmers have a negative uncertainty premium and cannot be induced to sell in advance for prices they expect to occur within such limits of "reasonable likelihood."

In a later part of this analysis, results are recorded of attempts to establish relationships between different levels of uncertainty premium and other characteristics of the farmer.

Sure-chance Questions

The sure-chance questions were introduced into the questionnaire in an effort to ascertain whether or not they could be used as a measure of the attitude of different farmers toward risk and uncertainty. The questions, together with the numbers of farmers answering the alternative in each case, were as follows:

If you were on a radio giveaway show and had the chance to (a) take $1,000 or (b) take $500 or $1,500, depending on the toss of a coin, what would you do?
(127) take the $1,000 and be sure of it.
(33) take the chance of either $1,500 or $500.[12]
What if the result depended not on the toss of a coin but on your answer to a question about corn belt farming?
(86) would take the $1,000 and be sure of it.
(75) would take a chance on the $1,500 or $500.
What if the same position applied to profit on one of your farm enterprises, such as corn storage, or selling; or selling cattle or keeping them for a little longer?
(96) would prefer to be sure of the $1,000 profit.
(65) would take a chance on the $1,500 or the $500 profit.
What if you had the choice between two farm plans so that the profit would be for the whole farm, not one part of it. Would your prefer to be sure of $5,000 or would you try another plan in which you might get $7,500 or $2,500?
(123) would prefer to be sure of the $5,000.
(38) would prefer to take a chance on the $7,500 or $2,500.
What if the two plans were for smaller amounts, but still applied to the whole farm plan?
(111) would prefer to be sure of $2,000.
(50) would prefer to take a chance on getting $3,000 or $1,000.

In a study designed to ascertain how farmers think about expected prices and uncertainty situations, there is always a danger of imposing on the farmer a pattern of thought which is in fact not relevant to his own thinking, if any, on the subject. If a uniformity of attitude is to be established between farmers, however, the farmer must be forced to play the game on your terms rather than his. The method is justified if the farmer's actions and attitudes can be interpreted in terms which establish meaningful re-

[12] One farmer was unable to answer this question as he could not imagine himself in such a situation. His reply to the other four choices was "sure" in each case. In Figure 1 he is placed in the "sure" answer to question 1.

lationships. If farmers act *as if* they calculate or expect or prefer in terms which are measured by the questions asked, then such meaningful relationships may be established by use of the questions.[13]

In this particular study the purpose of the questions was twofold: First, to explore a possible means of classifying farmers according to their reactions to uncertainty situations; second, to show how different institutional factors and other attitudes expressed are related to these reactions. Having established some basis for classifying farmers according to their attitude toward uncertainty, it may then be possible to establish relationships between such attitudes and the systems of farming adopted by different farmers. This implication is beyond the scope of this paper, but it was one

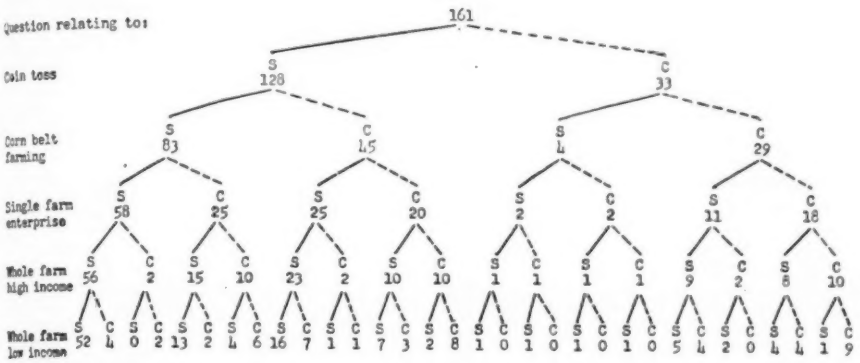

FIG. 1. PATTERN OF CHOICES EXPRESSED BY 161 FARMERS IN ILLINOIS IN ANSWERS TO QUESTIONS PRESENTING SURE-CHANCE ALTERNATIVES.

of the reasons for attempting to determine the usefulness of the sure-chance questions used.

As shown in Figure 1, the largest group of farmers (52) was composed of those who chose the sure alternative in all five questions. The next largest group (16) chose the sure alternative in all instances except in the second question, where the outcome depended on the farmer's answer to a question on corn belt farming. The next largest group (13) was composed of those farmers who chose the sure alternative in all cases except the individual enterprise situation on the farm (question number three). These three groups included almost half the farmers surveyed. The existence of nine farmers in the group who would take a chance every time is noteworthy.

The answers to these questions present a picture of the uncertainty preferences of this group of farmers. Added value will be given to these data if comparisons can be made with data on the attitude of farmers in

[13] This point is well made in M. Friedman and L. J. Savage, "The Utility Analysis of Choices Involving Risk," *Journal of Political Economy*, Vol. LVI, No. 4, August, 1948, p. 298.

other areas, and of farmers engaged in the production of different commodities, as well as with a similar group of farmers at a different time. Nevertheless, the usefulness of the questions and their relevance to the main argument of this study depend on the associations which exist between the answers to these questions and other data pertaining to each individual farmer.

Associations Between Sure-Chance Choices and Economic and Social Factors

The next phase of the analysis was concerned with the degree of association between the different variables about which information was collected during the survey. It was considered important to ascertain whether or not

TABLE IX. RELATION BETWEEN YEAR THE FARMER STARTED FARMING AND ANSWERS TO COIN TOSS QUESTION

Year farmer started farming	Number of farmers choosing:		
	Sure alternative	Chance alternative	Total
Before 1933	68	11	79
1933–41	32	8	40
1942–50	27	14	41
	127	33	160

$X^2 = 6.75$, and $P < .05$.

the attitudes toward risk and uncertainty expressed by farmers were related to such economic factors as capital invested and tenure status, and to sociological factors such as age and number of dependents.

Year farmer started farming.[14] Farmers often mentioned their experiences of the depression years. These experiences appeared to have made an indelible impression on those farmers who farmed throughout that period. In an effort to ascertain whether or not those farmers who started farming before 1933 tended to choose the sure alternative, farmers were classified into three groups and their answers to the questions analyzed by using the chi square test.

If a cross classification table is constructed, as in Table IX, it may be discerned from the total number within each classification group whether there is an association between the two variables.

The evidence from this result is that there is a significant association[15] between the answers to the question and the year that the farmer started farming.

The chi square test may also be used to test associations between groups

[14] This was taken to mean the year when the farmer began to work full time earning his living on a farm. He may not have been an entrepreneur at the time.

[15] At the five percent probability limit. This is the arbitrary limit used in many such tests, though there is no clear-cut division at this probability level between significant and insignificant relationships.

classified into more than two subgroups. Table X presents the results of this analysis relating to the year the farmer started farming and his answer to the last two questions combined, as well as to each question considered separately.

A farmer might answer these last two questions in one of four ways. He might:

1. Choose the sure alternative in both cases (SS)
2. Choose the chance alternative in both cases (CC)
3. Choose the sure alternative in answering the first question and the chance alternative in answering the second (SC)
4. Choose the chance alternative in answering the first question and the sure alternative in answering the second (CS).

TABLE X. ASSOCIATION BETWEEN YEAR FARMER STARTED FARMING AND ANSWERS TO QUESTIONS PRESENTING SURE-CHANCE ALTERNATIVES

Question relating to:	Year farmer started farming												X^2	P
	Before 1933				1933–41				1942–50					
	Number of farmers choosing													
	S		C		S		C		S		C			
1. Coin toss	68		11		32		8		27		14		6.75	.03
2. Corn belt farming	52		28		20		20		14		27		10.62	.01
3. Single enterprise	48		32		23		17		24		17		0.06	.95
4. Whole farm—high income	64		16		29		11		29		12		1.59	.45
5. Whole farm—low income	57		23		26		14		28		13		0.49	.80
Last two questions combined	SS	SC	CS	CC	SS	SC	CS	CC	SS	SC	CS	CC		
	54	10	3	13	24	5	2	9	20	9	8	4	14.41	.02

The test in this case does support the hypothesis that farmers who started farming in the same time period tend to answer the questions similarly. It is of interest to note that answers to the last two questions analyzed separately did not give a significant result; but when answers were considered together, a significant association was established. This supports the validity of the distinction between the last two questions, which would be particularly appropriate in this instance if farmers who started farming before the depression react differently when faced with a chance of securing only a small income. The result also emphasizes the need to consider not only farmers' answers to individual questions, but also the changes in choice made from question to question. A higher proportion of the farmers who started farming from 1933–41 chose the chance-chance alternative in questions four and five. Those starting farming before 1933 appeared to prefer the sure-sure combination, as would be expected from farmers influenced by severe financial loss during the depression of the 1930's. Note also the relatively high number of farmers who started farming after

1941, and preferred the chance alternative in the high income situation and the sure alternative when the farm income was much lower, as in the fifth question.

Analyses of a similar nature were made for several other traits of farmers classified into groups according to the economic and social characteristics

TABLE XI. SUMMARY TABLE: RESULTS OF CHI SQUARE TEST OF ASSOCIATION BETWEEN ECONOMIC AND SOCIAL FACTORS AND ANSWERS TO QUESTIONS PRESENTING SURE-CHANCE ALTERNATIVES

Basis of classification of farmers	Question relation to: Radio program 1 — Coin toss	Radio program 2 — Corn belt farming	Farm situations 3 — Single enterprise	Farm situations 4 — Whole farm, high income	Farm situations 5 — Whole farm, low income	Farm situations 4 & 5 — High and low income situations considered together
			*Probability**			
Tenure—owner or tenant	.70	.03	.45	.50	.60	.55
Ownership—inherited or purchased	.90	.50	.70	.15	.50	.20
Capital invested by farmer	.60	.45	.20	.40	.10	.30
Year farmer started farming	.03	.01	.95	.45	.80	.02
Number of dependents	.60	.95	.70	.55	.20	.70
Education	.60	.001	.05	.40	.80	.02
Age	.01	.001	.20	.20	.03	.001
Would or would not contract for forward sale of corn	.35	.90	.10	.10	.02	—
Uncertainty premium —farmers in allotment	.55	.10	.15	.50	.80	—
—farmers not in allotment	.55	.25	.65	.80	.80	—
Price optimism index	.15	.02	.55	.30	.60	.40
Expected corn price	.50	.10	.50	.15	.02	.02
Expected corn yield	.65	.50	.35	.50	.25	.65
Does or does not receive weekly newsletter from University of Illinois	.50	.50	.70	.85	.90	.95
Does or does not follow futures market	.98	.65	.15	.35	.15	.50
Will or will not stay within the allotment	.55	.70	.60	.25	.99	.30

* If the basis of classification and the answers to the questions were independent, any relationships in the sample would be due to chance, and the likelihood of securing a large chi square would be very slight. The *P* values record the probability, under this assumption of no relationship between the variables, that a chi square at least as large as the one given by the sample would be obtained. Hence there is more basis for concluding that a significant association exists when a low probability is recorded. The *P* values from .05 to .95 have been rounded to the nearest multiple of .05.

thought to be significant in influencing their attitude toward uncertainty. The results are summarized in Table XI. The method used in building up this table can be seen by noting the *P* values in Tables IX and X, as they reappear in Table XI.

One notable feature is that the most consistent associations between the attitudes toward the uncertainty questions and other factors exist in the

cases of the year the farmer started farming, his education, and age. The attitudes toward the forward sale contract for corn and the level of expected corn prices also appear to be related, though not so consistently as the above "institutional" factors. In answers to the second question, as would be expected, the farmers with grade school education tended to choose the sure alternative, while the majority of high school and college educated farmers chose the chance alternative. College graduates were much more inclined to take the chance in question three, relating to the single enterprise. The significant result in the combined answer to the two last questions appeared due to a tendency for the grade school educated farmers to choose the chance alternative in each case; and for the high school educated farmers to choose the sure alternative in the high income situation and the chance alternative in the case of the low income. In the age classification the young farmers tended to take more chances. In addition, the results showed a marked tendency for the young farmers to choose the sure alternative in answers to the high income question, and the chance alternative in answer to the low income question. The middle-aged farmers showed a strong tendency to choose the chance alternative in answer to both of these questions.

Conclusions from the Field Survey

The data secured relating to price expectations are in accord with the idea that farmers consider future prices in terms of a range of possible prices. Within this range a most probable price can be discerned; evidence suggested that this most probable price, as stated, was not simply a mean of all prices expected, weighted by the probability of each possible price. These expected price distributions were frequently skewed, i.e., the mode and mean did not coincide. Farmers tended to indicate that their own ideas as to expected price levels were unimportant. It would appear that a comparison of different commodity prices may lead to more fruitful interpretations of the way in which farmers think and act. A major problem remaining is the determination of the single stated price which can best be used for such comparisons.

The results presented in Table III relating the ratios of expected corn and soybean prices to plans regarding the corn allotment program indicate that such comparisons need to be made within a smaller, more uniform region than the type of farming area; within a smaller area alternative opportunities would be more comparable on different farms. Too many extraneous influences appear in the wider type of farming area, though of course a major problem is involved in determining whether such extraneous influences are in fact more important than expectations regarding price to which attention is directed. This study has shown that farmers will willingly express a price range; that they tend to round off expectations; and that stated most probable prices are often at one extreme of the ex-

pected range, suggesting that the range stated is one between two values each of which express the price most likely under two different outcomes.

The farmers clearly expressed a desire to retain their economic destiny in their own hands by generally preferring not to contract to sell their corn in advance at a price equal to that which they expressed as most likely. A farmer who did not contract in advance would remain free to sell his corn, feed it, or, if he remained in the allotment, to store it under government loan. The farmer who sold forward exchanged these alternatives for the certainty of a price agreed upon in March. There appeared to be a relationship between the farmer's willingness to contract and his answers to the questions relating to uncertainty situations.

The survey was a study of attitudes rather than of motivations, though the ultimate goal in this type of research is the understanding and interpretation of farmers' decisions. The questions presenting the sure and chance alternatives were designed to give a ready measure of the attitude of farmers to uncertainty situations. Table XI presents the results of the attempt to relate answers to these questions to other social and economic characteristics of the farmers, and it would appear that the questions do make possible a classification of farmers according to their uncertainty preferences. The questions may perhaps be refined by adding more and more favorable chance outcomes, so that all farmers could be induced to take the chance alternative. The farmers could then be ranked according to the stage at which they were induced to choose the chance alternative. The experience of the survey showed that the first two questions were useful in orienting the farmer to think in terms of the sure-chance alternatives relating to farm situations. The results obtained and the interest displayed by farmers in the questions were sufficiently encouraging to justify persistence in this line of investigation.[16]

Some Implications for Farm Management Research

The nature of uncertainty is such that its influence would be expected to vary among different systems of farming. It has been shown that this influence is not random with regard to other factors by which farms or farmers may be classified. Consequently, its effects may be confounded with those of the variables studied in an analysis of technological factors affecting farm income. When a group of farms is analyzed and a system of organization or management is shown to be associated with high income, the implication is that other farms of the same physical potentialities can achieve similar results by employing the practice. This conclusion is subject to two assumptions, the validity of which depends upon the organization of the farms concerned.

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[16] The greatest difficulty was encountered in obtaining answers to question three relating to the single farm enterprise. Answers to other questions were given without hesitation. See footnote 13.

The first assumption is that the effects of uncertainty in the past did not operate with a different effect as among the groups of farms used in the analysis. If this uncertainty has exerted a different effect on each group, then this effect needs to be recognized and not confused with the other phases of organization and management. A farmer who in the past "played safe" is not comparable in all ways with one who in the past "took his chance."[17] Whether or not the basis of classification adopted to form the groups of farms also inadvertently classifies farmers or farms according to uncertainty characteristics depends on the associations between the farmer's attitude toward uncertainty and other characteristics of the farmer, some of which may be used to classify farmers into groups. An attempt to define some of these relationships has been made.

The second assumption is that the farmer who is expected to "go thou and do likewise" is willing and able to run risks and to expose himself to the uncertainties in the particular manner prescribed by the management program recommended on the basis of the analysis. If, for example, a heavy beef feeding program is prescribed, its adoption will depend on the farmer's ability or willingness to face the uncertainty of changes in the "margin" between buying and selling prices. This attitude toward risks needs to be superimposed on the conclusions drawn from analyses of groups of farms.

If these things are important in farm management, there is need to concentrate attention on the nature of the farmer's expectations and on differences in attitudes toward uncertainty among different farmers. The interpretation of farm management research results in their application to any one individual farm has, in the past, been a hit and miss affair. Extension agents have been left to their own devices to develop principles by which they can take account of the aspects of farm management which relate to uncertainty and the farmer's response to it.

Some Unresolved Questions

The development of a set of principles linking empirical data and economic analysis is still in an early stage. A listing of some of the major unresolved questions in this general area of the effects of uncertainty on decision making by farmers may assist in the development of this work. The list is based in part on questions raised by recent advances in the theory of the firm, and in part on the very real practical difficulties encountered in this survey in identifying empirical counterparts of some of the variables used in economic analysis. This is an important phase of farm management research, because factors influencing farm income are considered to be identified incompletely if no account is taken of the effects of uncertainty on farm incomes.

[17] F. H. Hahn, "A Note on Profit and Uncertainty," *Economica*, New Series, Vol. XIV, No. 55 (August, 1947). Hahn's argument includes a clear indication in analytical terms that profits may be at a different level in different firms and yet not induce transfer of resources from one enterprise to another because of the existence of different expectations and risk preferences.

I. *The Nature of Farmers' Price Expectations*[18]

A. What is the relative importance of long and short term price trends in the past on the prices now expected by farmers?

B. How do farmers aggregate the total effect of a series of mutually exclusive prices which they consider may possibly occur?

C. Are the probabilities of alternate price expectations capable of being scaled or only of being ordered? Are the probabilities of different price expectations distributed in the form of skewed or symmetrical frequency distributions?

D. What is the relationship between (1) the farmer's *stated* answers to questions as to price or price range most likely to occur, and (2) the *actual* range of possibilities of prices which he expects with a probability of occurrence greater than zero?

E. Are expectations in absolute terms relating to each commodity, or are they merely in comparative terms linking the relative prices of commodities competing for resources?

F. What is the relationship between farmers' expectations on a technical basis, such as crop yields, and price expectations? What degree of change in expected production would induce a change in price expectations?

G. Is Shackle's proposition to concentrate attention on "focus gain" and "focus loss" an aid in interpreting decisions by farmers?

H. What influences on the level and nature of expectations are exerted by such factors as age, health, debt, and tenure status? What is the effect of the farmer's environment, such as periodicals, government agencies, banks, the local elevator, and other social groups?

II. *The Nature of Farmers' Uncertainty Preference*[19]

A. What is the farmer's attitude toward operating under conditions of uncertainty? What is the influence of personal factors such as age, debt status, income level, and comparative skill in alternative enterprises, on the farmer's willingness to expose himself to uncertainty?

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[18] Some references which present empirical data or analytical discussions relating to these questions are:

A. T. Anderson and R. C. Ross, *Postwar Farm Jobs and Farmers' Purchase Intentions*, University of Illinois College of Agriculture Circular 592, 1945.

R. W. Coase and R. F. Fowler, "The Analysis of Producers' Expectations," *Economica*, New Series, Vol. VII, No. 27, August, 1940.

T. W. Schultz and O. H. Brownlee, "Two Trials to Determine Expectation Models Applicable to Agriculture," *Quarterly Journal of Economics*, Vol. LVI, May, 1942.

G. L. Shackle, *Expectation in Economics*, Cambridge, England: Cambridge University Press, 1949.

[19] For references on these questions see the following:

O. H. Brownlee and W. Gainer, "Farmers' Price Anticipations and the Role of Uncertainty in Farm Planning," this *Journal*, Vol. XXXI, No. 2, May, 1949.

M. Friedman and L. J. Savage, "The Utility Analysis of Choices Involving Risk," *Journal of Political Economy*, Vol. LVI, No. 4, August, 1948.

III. *Relationships Between Expectations and Decisions*[20]

A. What is the length of the economic horizon, i.e., the length of the time period beyond which events which may occur do not influence present decisions?

B. What is the effect on farmers' decisions of alternate mutually exclusive possible events, which may each (1) have some result in common, (2) have several other possible outcomes in addition to the possible result which is common to each? (For example, in the case of a short crop the price expected may be a range of $1.00 to $1.40; in the case of a long crop the price may range from .75 to $1.00. The $1.00 price is thus a possible result in either case, but it is only one of a whole distribution of possible outcomes in each case. A series of intermediate crops may also be considered as possibilities.)

C. Can the riskiness of alternative farm enterprises be established and related to the stated uncertainty preferences of farmers who have chosen among these different enterprises? What are the effects of uncertainty on farm organization, and how do farmers adapt their operations to its presence?

D. Which aspects of price expectations provide a basis for interpreting the decisions of farmers? Does a comparison of expected net returns per acre from competing cash crops reveal a significant relationship with crops actually grown?

The questions are listed here as an indication of the scope of the problem on which so little empirical data are available. In the initial stages of this research much probing and experimentation will be needed, to set the stage for more "practical" investigations which will enable more accurate prediction and interpretation of decisions by farmers. The results of one such initial attempt have been recorded in the hope that further progress can be founded on this experience. In this particular study emphasis was placed on establishing the usefulness of this type of approach in farm management research.

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[20] For references on these questions see:

E. O. Heady, "Uncertainty in Market Relationships and Resource Allocation in the Short Run," this *Journal*, Vol. XXXII, No. 2, May, 1950; and "Application of Recent Economic Theory in Agricultural Production Economics," this *Journal*, Vol. XXXII, No. 4, Pt. 2, November, 1950.

D. Horton, "Adaptation of the Farm Capital Structure to Uncertainty," this *Journal*, Vol. XXXI, No. 1, Pt. 1, February, 1949.

D. Gale Johnson, *Forward Prices for Agriculture*, Chicago: University of Chicago Press, 1947, Chapters IV–VI.

G. L. Johnson, "Needed Developments in Economic Theory as Applied to Farm Management" this *Journal*, Vol. XXXII, No. 4, Pt. 2, November, 1950.

R. Schickle, "Farm Business Survival Under Extreme Weather Risks," this *Journal*, Vol. XXXI, No. 4, Pt. 2, November, 1949, and "Farmers' Adaptations to Income Uncertainty," this *Journal*, Vol. XXXII, No. 3, August, 1950.

RECENT AGRICULTURAL DEVELOPMENTS IN EASTERN EUROPE

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Introduction

THE purpose of this paper is to describe the policy of collectivization in Eastern and Southeastern Europe. The countries discussed are Bulgaria, Czechoslovakia, Hungary, Poland, Roumania, and Yugoslavia. Differences in their prewar state and their postwar developments have been great. Yet in retrospect, it seems that everything that happened fitted into a pattern, and in the final stage similarities are far more striking than dissimilarities.

In order to appreciate the full portent of the policy of collectivization and the resistance to it, it is necessary to sum up briefly the principal characteristics of the agriculture of this area before World War II and discuss the first postwar changes, which were the very opposite of collectivization.

The Prewar Situation

Generally spoken of as the larder or breadbasket of Europe, this area once produced one fourth of the agricultural net output of Europe, excluding the USSR, and exported considerable quantities of agricultural products to Western Europe.

Five of the six countries under consideration were agricultural exporters, but they differed from similar countries on this side of the Atlantic. First, in each of them exports of nearly all of their staple products amounted to a small fraction of the total output because home consumption was relatively large. But agricultural exports were sufficiently important in relation to what was sold off farms and in relation to total exports to affect the general well-being of these countries. Second, the export surpluses were more apparent than real because nutritional standards were low. Even a modest increase in domestic consumption, which would have left it still below the standard advocated by the experts of the League of Nations, would have wiped out most, if not all, that was available for exports.

Apart from climate and soil, farming practices and standards were determined by the special characteristics of the agricultural population and the pattern of the distribution of land.

Most of the private holdings of land were below the size of a subsistence farm, in that area 10–15 acres.[1] Family farms, 15–50 acres, were much

[1] By subsistence farm is meant a farm which enables a peasant family to attain a living standard customary for small peasants in a well defined region. Its size would vary in one country and even more from country to country. But unless conditions are quite exceptional, its size would lie between the limits given.

less numerous. Medium-sized farms of several hundred acres were a negligible group in numbers and total acreage. Privately owned large estates of 1,400 acres and over were important in Poland and Hungary only.

In some of these countries, most notably in Hungary, a peculiar feature of the distribution of land was that the State, the local authorities, and the churches also owned and operated large tracts of land. Much of this land consisted of forests but also included arable land.

General farming and the same products were characteristic both of small holdings and large estates. They all tried to produce as much as possible of the food requirements of the owners, operators, and hired hands, paid usually in kind. They even grew most of the foodstuffs which they converted into animal products. Agriculture was largely self-sufficient.

A number, but by no means all, of the larger estates and some of the smaller farms employed up-to-date techniques. But as labor was abundant and cheap, even on these, most of the cultivation was done by hand. To provide more employment, in some countries the use of combine harvesters was prohibited or subject to permission. On some of the larger farms and on most of the small ones the standard of farming was low. Even in one country, the range in yields was great, as a good farm produced two to three times as much wheat or corn per acre as a poor farm. In the region as a whole, the range was immense and sank from the level of Bohemia and Moravia, which compared favorably with the highest standards in Europe, to the medieval, open field system and wooden plows in the most backward districts of Yugoslavia and Bulgaria.

Most of the owners of the farms and certainly all the agricultural workers were peasants. The origin and sociology of the peasantry need not interest us here. Distinguished by dress, speech, manners, traditions, ways of life, they were a clearly recognizable group in each of these countries. A society within a society, the peasantry had a hierarchy of its own. There was a great difference in the living standards but an even greater one between the social status of a landless agricultural laborer and that of a wealthy peasant owning one hundred acres or more. In this society the measure of social standing was the amount of land owned and not the size of income. Disproportionate effort and savings went into acquiring land or adding to the size of the holding in comparison with what was spent on improving output and increasing income. The high density of the agricultural population and the few outlets for the large surplus population in agriculture, characteristic of most of the area, created tensions which became explosive where the situation was aggravated by great inequalities in land-ownership and income. The situation could be eased but not remedied by the redistribution of land, demanded by the peasantry and advocated by progressive forces.

It may be noted in passing that, in the very countries that needed it most, the inadequate outlet for a rapidly growing population was due to rather

poor basic resources and lack of capital. Moving the surplus population out of the country was difficult if not impossible. The small density areas of the world became practically closed in the interwar period. Besides, in a world where people belong to different ethnic groups which look upon the maintenance of their peculiar traditions as the aim and reason of their collective existence and where strength is measured in numbers, emigration to alien lands was looked upon as loss of blood and a national disaster.

War and the Land Reform

In nearly every country the drain on man-power, the reduction of livestock, and the inadequate supply of implements and requisites during the war resulted in poorer cultivation and inferior yields. In general, in the course of and after the fighting, equipment, installations, and livestock suffered, but the severity of the damage varied greatly. The highly developed western parts of Czechoslovakia were rather lucky and escaped lightly. Poland and Yugoslavia fared worst and suffered destruction on an immense scale.

Apart from the effect on production, the war damage and the general dislocation that followed the war had important social consequences. They had a far reaching levelling effect and made the larger farms bankrupt. Most of the equipment was destroyed or put out of condition, the livestock was gone, the liquid funds annihilated, the hired labor, on which they depended, greatly reduced. Even in a political atmosphere not hostile to them, the large estates would hardly have been able to cope with the immense task of reconstruction and start production on anything like the prewar level. The peasant farms with their primitive equipment and methods were relatively in a very much better position, and in all countries the recuperative powers of the largely self-sufficient peasant farms was remarkable.

The number of peasant farms increased because in 1945, radical land reforms broke up the large estates in all countries; and where there were none they broke up even the larger peasant farms. Farms of 100–200 acres became a rarity. In order to benefit a large number of families, the size of the new holdings was small, rather less than 10–15 acres, thus swelling the already large number of such farms.

The proportion of land mobilized was greatest in Hungary and Poland, where the land reforms of the interwar period did not basically alter the distribution of land and where large estates occupied a larger area than in the other countries. It was smallest in Bulgaria, which had come nearest to the ideal of an equalitarian peasant society.

In all countries the forests were taken over by the State. Some of the cultivated land was reserved for state farms, but most of it was given to new owners as freehold property, subject to a limitation of the right to sell

it within a fixed period and the obligation to pay a nominal price for it in instalments. Even where the right to compensation was acknowledged by law, practically nothing was paid to the original owners, not even to institutions like the churches, which had built and maintained schools, hospitals, and other charitable institutions out of the income from their estates.

The breaking up of the large estates was accompanied by great destruction of capital in countries where capital was scarce. The new small farms had no use for the heavy machinery, big barns, buildings, and other installations of the large estates. Where they had been spared by the war, many of the buildings were carelessly torn down and their material used to build cottages and small farm buildings, while much of the machinery was reduced to scrap. A hostile atmosphere, fomented by the Communists, welcomed the destruction of the last physical vestiges of the large estates, blamed as the scapegoats of the old social order, and the public authorities did little or nothing to prevent destruction at that time. Comparatively seldom did the beneficiaries of the reform and/or the authorities have sense enough to hand over the management of building and equipment to hastily formed cooperatives to prevent their destruction.

The driving force behind these land reforms was the Communist Party. It appeared as the staunch defender of small farming. Its slogan then was that the land must be owned by the people who tilled it and all other considerations were overruled. The Party was loud in denouncing those who maintained that the ultimate aim of Communist policy would be the collectivization of agriculture. Developments soon showed that the land reform was a tactical concession which served two purposes. It destroyed the material power and independence of people and institutions who were opposed to Communism and, without antagonizing the rest of the peasantry, enlisted a measure of support for the Party from the poorer sections of the peasantry, the beneficiaries of the reform.

The immediate effect of the reform was that with primitive methods and equipment a larger proportion of the land was put under cultivation than would have been possible without the reform. As a result of the cumulative effects of the war, the relative inefficiency of the small farms, and the severe drought that afflicted these countries in 1945, the amount of food produced in the first postwar years was very much less than before the war, although it was probably greater than it would have been otherwise.

A large proportion of the landless peasants rose into the coveted class of owner-operators, improved their social status and, if they had the makings of farmers, their living standards. But the long term prospects of agriculture were bleak. Equipping well over half a million new small farms with livestock and implements, and improving farming techniques on old and new small farms in countries where the standard of education in rural areas was low and the administration was not noted for its efficiency, was

an overwhelming if not an impossible task. But even if it could have been achieved, it would not have remedied the basic ill. Old and new farms were uneconomic units and were becoming even more uneconomic because of the customary division of land among the descendants upon the death of the owner. Labor was inefficiently utilized. There was also the problem of those who could not be given land and could not find employment on the small farms either. Population pressure, reflected in underemployment and low wages before the war, now appeared in a stark form, making the need for industrialization even more pressing.

Without further intervention the antagonism between the new and the old established peasant owners, which was noticeable at the time of the reform, would have died away and a more or less equalitarian peasant society would have emerged. Communist theory expected the reemergence of sharp class distinctions between rich and poor in the villages, as some peasants with more initiative and industry would improve their position at the expense of their less clever and less fortunate fellows.

Apart from the practical difficulty of dealing with peasant agriculture there was also an ideological question. Yugoslavia became very early a people's democracy aiming to build socialism. Other countries started as democracies with a more or less socialistic flavor and did not turn into people's democracies until 1949. Sooner or later, all were faced with a question of principle—what to do with private ownership and private enterprise in agriculture in a socialized economy. According to Leninist doctrine there was only one answer to this question—agriculture had to be collectivized. The first postwar economic plans showed the intractability of peasant agriculture and were used to supply the argument for collectivization.

The Over-all Economic Plans and Agriculture

In most countries the worst part of clearing up the ruins of war and setting the economic machine in motion was carried out largely by private enterprise and by mobilizing private funds. Workers and employees contributed by accepting work for miserably low wages and salaries and under incredibly hard conditions. As soon as this phase was over, all countries embarked on over-all economic plans.

These were in essence reconstruction plans.[2] They aimed at restoring in two or three years the productive capacity and the national income to levels corresponding to or slightly above the prewar period. With scant resources and an economy largely out of gear, there was a *prima facie* case for concerted and planned action. But the plans had a bias. Most of the public investments went into mining, power, manufacturing, and transport while agriculture was badly neglected. A large proportion of the agricultural

[2] Yugoslavia alone embarked immediately on a more ambitious Five Year Plan and skipped the phase of the "warming-up plan."

investments so-called were, in fact, investments in industry. They were intended for the reconstruction and construction of plants manufacturing agricultural machinery and fertilizers, the electrification of villages, the building of roads in rural areas, etc. Otherwise, a large proportion of the rest of the budgeted investments in agriculture was to come from the farmers themselves. To make matters worse, credits for farmers were severely curtailed.

An interesting novel feature of the agricultural plans was the establishment of tractor stations. They were owned and operated by the State and had 10–14 tractors and other machines, each with the appropriate personnel. Farmers could have their lands plowed, etc., by the tractor stations at prices set by the government. The breaking up of the big estates with their large fields offered less scope for the use of tractors and other big machinery. Nevertheless, without further explanation, the mechanization of agriculture and the increased use of the tractor as the prototype of mechanization were propagated as an aim worth pursuing for the sake of greater efficiency.

Otherwise, the agricultural section of the plans provided funds for the reconditioning of plant and livestock breeding stations, for the establishment of artificial insemination stations, for the improvement of salty and alkaline soils, for the draining of marshy lands, for river and flood control, for the extension of irrigation, for reforestation, for some extension of experiment stations, for some improvement in agricultural education, etc.

The projects planned were very similar to, and were in many cases the continuation of, those undertaken or started before the war. Because of the inadequacy of prewar efforts to improve agriculture and the smallness of postwar investments in agriculture proper, full implementation of the plans could have brought about modest improvements but could not have substantially raised the standard of farming. This would have required a larger and different outlay and much greater effort.

While investments of the State undoubtedly helped, most of the improvements in agriculture were due to the efforts of the farmers themselves. Buildings were reconstructed and erected in the villages and on the land of the new owners, in the usual primitive peasant fashion; fields were cleared of mines, tank ditches, tanks and other débris of the war and brought under cultivation; livestock was increased. Had it not been for a series of droughts, progress would have been even more remarkable. Old and new peasant farmers were settling down to the pattern of farming which they knew.

There were snags, however. The crop plans which formed an integral part of the over-all economic plans were designed to increase the acreage under industrial plants and fodder crops, to decrease the excessive acreage under cereals, and to increase output. Partly because of the weather and partly because the plans ran counter to the peasants' ideas of farming, agriculture failed to reach the targets of the plans.

In some exceptional cases the opposite was the trouble. In Hungary, fearing that the peasants would not grow enough sugar beets, which had heretofore been grown mostly on large estates, the government offered very favorable terms to growers. The response exceeded expectations and beets were grown on an acreage more than twice as large as before the war. However, the crop was only slightly larger, owing to lower per unit yields.

In all these countries agriculture was a key industry. The success of the over-all economic plans demanded not only an improved and safe food supply for the growing industrial population, but also a surplus for export which was expected to pay for industrial raw materials and the machinery demanded for industrialization. The same policy demanded the concentration of industrial production on capital goods, which meant that the supply of consumers' goods had to be cut down and their quality had to become poorer. Thus farmers had less incentive to sell. Apart from this, as a result of the land reform consumption on the farms had increased.

The over-all economic plans were used to nationalize all the important sectors of economic life and prepare the way for the socialist transformation. Agriculture was the last stronghold of private enterprise and capitalism. The foreseeable difficulties of directing and controlling peasant agriculture gave an excuse to the Communists to attack the small peasant farm, idolized at the time of the land reform.

The Policy of Collectivization

The Communist Party, which in the first postwar years initiated radical land reforms and appeared as the staunch defender of small farming, made a complete turn in 1948, suddenly denounced the inefficiency and the slow progress of peasant farming and came forward with a policy of collectivization. The collective farms were referred to as agricultural producers' cooperatives and the process of collectivization was to be "voluntary."

Collective farms had been non-existent in all these countries. The rural cooperative movement, which was highly developed in some of them, meant credit cooperatives, cooperative grocery stores, marketing and processing cooperatives. The producers' cooperatives so-called were, in fact, engaged in marketing agricultural products and buying various requisities for farmers, except in Bulgaria, where there were some genuine producers' cooperatives.

Bulgaria and Yugoslavia were the only two countries where, in some districts, the *zadruga*, the large family as an economic organization, survived. Nothing approaching the Russian *mir* was known. Almost everywhere peasants preferred individual ownership and management of the land. Little was known about the collective farms in the USSR, and it was not until the last war that peasants, drafted into the armies of the countries at war with the Soviet Union, saw collective farms. What they saw did

not impress them favorably and did not make the idea of collective farming popular. The living standards of the Eastern European peasants were low in comparison with farmers in Western Europe but were high enough in comparison with what they saw on the ordinary run of collective farm.

The large number of "peasant cooperatives" established in all these countries in 1945 and soon after had little to do with organizing production and collective farming. They were set up to take over the stores and activities of the centralized prewar cooperative movement which had operated with a conservative political bias. They also engaged in a number of new trading ventures, took over the distilleries and other industrial plants of the former large estates and their heavy machinery, which they were supposed to use on a hire-work basis. Few of the cooperatives engaged in agricultural production and if they did, it looked very much like a capitalist enterprise with paid technicians. Even fewer was the number of collective farms, set up in 1945 and soon after. It was significant that where such were founded on the most advanced lines, they soon had to revert to the most primitive type, hardly deserving the name of a collective farm, because the peasants did not like their methods. Even so, there was a tendency to drift out of the collectives as soon as the members became a little more prosperous. Until 1948, genuine voluntary collectivization had made hardly any progress and the acreage and output of collective farms was of no consequence. Collectivization appealed only to the unsuccessful small peasants or to those who, not having obtained land in 1945, were eager to seize upon this chance of getting established in agriculture in preference to moving to the towns.

The announcement of collectivization as a policy in 1948, and the speeding up of the drive in Yugoslavia, was heralded and accompanied by a number of measures which revealed the true meaning of the "voluntary" process.

The transfer of land through sale became subject to permission, and the government reserved the right to preemption. Leases became also subject to permission, and the government reserved the right to nominate tenants and fix rents. Compulsory deliveries of produce which had been fixed at a flat rate per acre of arable land became steeply graded with the size of the holding. A sharply graded special tax was introduced on all farms larger than the subsistence farm. Peasants with larger farms were debarred from the cooperatives and lost access to cheaper credit and cheaper supplies of requisites. Government regulations concerning farming became more frequent and more detailed, and were rigidly enforced against "kulaks."[3]

[3] The Russian word "kulak" is used by the Communists in all Eastern European countries to denote the "class enemy" amongst the peasants as against the "working peasant." No exact definition was ever given and the vagueness of the term is very convenient because its meaning can be extended. In the initial phase of "class war in the villages" the "kulak" is the rich peasant who regularly employs hired help. Between him and the "working peasants" is

The slightest infringement of the spate of rules was punished severely. Punishment included heavy fines, loss of civic rights, imprisonment, loss of property, and banning from the village. If forced to sell out, the richer peasants could offer their land for sale only to the government and could obtain only the price fixed by the government.

To hasten the process of liquidation of private farming, press and local "action committees" are now geared into a campaign against the more prosperous peasants. All those who display hostility by action, comment, or even attitude against the collectives are punished. Agitation against the collectives, persuading people against joining them, using derogatory language in referring to them can bring punishment by imprisonment.

At the same time privileges are bestowed on those joining the collectives. They are relieved from paying for the land obtained in the course of the land reform. Members of the collectives are individually free from the land tax and compulsory deliveries of produce; they have social insurance free or on favorable terms. The growing of profitable cash crops is reserved for the "working peasants" and collectives. The collectives receive all the assistance the government can give in free or nearly free grants of farm animals, fertilizers, implements, improvements to buildings and installations. The tractor stations give their services at reduced fees and offer preferential treatment. The collectives are charged much less for irrigation water. They can demand the reallocation of the fields of the village in order to consolidate their own fields. The efforts and achievements of the collective farms, and even more those of the collective farms of the USSR, are publicized in glowing terms. Hundreds of peasants from these countries (with the exception of Yugoslavia) are taken for conducted tours to the USSR to visit Moscow and selected collective farms, and great publicity is given to the reports they make.

The Organization of the Collective Farms

The drive for collectivization made it necessary to establish the legal form of the collective farms. Special branches of the postwar peasant cooperatives were to be the centers of all cooperative activities in the villages. Peasants employing hired help regularly were debarred from membership. Others, including tenant farmers, landless laborers, and technicians, could all join. Those who join get some payment for the livestock, seed, and forage turned in and if they own land retain their title to it. In some countries they receive rent for their land from the collective farm within limits prescribed by the government. In marked contrast to the USSR, in the Eastern European countries the land has so far not been nationalized.

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the poorly defined group of "medium peasants." The ruthless elimination of the "kulak" is expected to soften the "medium peasants." If they refuse to budge and remain hostile to the collectives, they become "kulaks" and the same fate is meted out to them.

The principal organs of the collective farm are the general meeting of all its members, and the executive committee of three to five elected by the general meeting. The chairman of the committee, elected for one year by the general meeting, is, in fact, the manager of the collective. Model by-laws have been issued, but even so, each collective has to be approved by the Minister of Agriculture. Decisions of the central authorities determine a large proportion of the overheads of the collectives: the fees they have to pay for the services of the tractor stations, the price of irrigation water, the amount of produce they have to deliver, the tax they have to pay. They also determine the allocation of the net income between investments and reserve funds, the amount that can be paid out as rent, and the residual which is paid out as remuneration for labor. Decisions of the central authorities determine the total acreage of individual crops, the targets in output, and their local agents see to it that the crop plan and other decisions of the individual collectives conform to the national plan. Directives of the authorities regulate in minute detail the technical operations on the fields.

Within this framework the collectives are free to act. Their freedom is confined to inventing the best methods for complying with the directives of the government and for achieving and possibly even surpassing the targets set. The big decisions cannot be questioned or even criticized. Criticism is limited to the method of application.

There are three types of collective farms. In the first, the most primitive type, the land is pooled to allow operations on large fields. But only the plowing and planting, the principal operations that can be performed by machinery, are the work of the collective. As soon as the crops are planted, each member has his fields assigned and he cultivates and even harvests his crops individually. Within the limits of regulations which control the marketing of agricultural products the members are free to dispose of their produce. After defraying the charges imposed by the collective, they are able to pocket and use the rest of their income as best they can. They are not compelled to pool all their land nor all their livestock.

In the second type, members not only pool their land but, organized by the executive committee, perform the operations collectively. When the expenses of these collective farms are cared for and the allocations required by the government made, the remaining proceeds are divided amongst members, in proportion to the amount of their land, but taking the average yields of the whole collective.

In the third and most advanced type, which is the ultimate goal of collectivization, members pool all their land with the exception of a small plot for a vegetable garden and orchard around the house, limited by decree to less than one to two acres. They also pool their farm animals with the exception of a cow and her calf, one breeding sow and her litter, one or two pigs for fattening, and their poultry. The work on these collectives is

done by the members organized into permanent gangs of six to 10 persons, so-called "brigades," working according to the instructions and under the supervision of the executive committee. The work performed is measured by "working days." These not only bring different operations to a common denominator but also bring in payment on a performance basis. A minimum number of "working days" is required from members of the collectives and their families. After defraying the overhead charges of the collectives, including tax and deliveries in kind, and making the allocations required by decree, the remaining proceeds are divided among the members by distributing in some countries one part of the proceeds, the maximum of which is fixed by decree, on the basis of the acreage contributed, and the rest on the basis of "working days." The practice is not uniform and protests against paying rent are being staged already. It seems that the payment of rent was introduced only to lure the "medium peasants" into the collectives.

Leaving the collective farms is possible by law. But the member leaving is not entitled to an equity for all he contributed and cannot get his fields back. He would get only the land the executive committee sees fit to allocate him. In the prevailing atmosphere he would be doomed as an independent farmer. The fact is, collectives do not make it easy for their members to leave on their own wish. But they have the right to expel them, which is one of their most powerful weapons in exacting compliance and discipline.

The size of the collective farms is rather small, 300–400 acres, but is growing. By setting up these farms the governments are bringing agriculture under their effective control, except for the weather and the human factor. Within these limits they are reducing the problem of planning in agriculture to manageable proportions. The number of units to be dealt with will be reduced to nearly one hundredth, if not less, of what it was. With the help of the tractor stations these units can be made to follow the directions of the central planning agencies with a reasonably small margin of tolerance. Besides fitting it into the general production plan, the government can effectively squeeze agriculture to yield the funds and the man-power it needs. Through the fees of the tractor stations, compulsory deliveries of produce, the tax levied on the collectives, the allocations for investment and the reserve funds, the government can absorb directly one part of the income of agriculture. Through fixing the terms of exchange, the prices of agricultural products offered for sale and the price of the manufactured goods the peasants buy, it has a second set of controls and can determine the real income of the agricultural population within narrow limits.

Under the system of collective farming, the well known strips of fields of the Eastern European landscape will disappear and the checkerboard pattern of the large estates will return. In their lay-out the collective farms

come curiously close to the former large estates. The core of the collective farm is often what had been the center of an estate. In a village, the inhabitants of which would form several collectives if it is sizable, groups of large sties and stables will have to be erected to house the livestock. The small fields around the village will be consolidated and then laid out again in big fields according to the system of rotation practiced, with some land reserved for orchards. In districts where the peasant farms were larger and homesteads of the American type prevailed, the establishment of collective farms will be more difficult. Possibly, with the physical liquidation of the larger peasant farmer, some of the homesteads will be extended into hamlets and the rest destroyed.

Parallel with the drive for collectivization, there began a drive to extend the size of the agricultural land held by the State. The land reforms of 1945 did not spare the holdings of the State and of the local authorities in the countries where such holdings were extensive, as in Hungary. What was left served the purpose of stud farms, experimental farms, etc. Some of the land was held as a reserve for future distribution. Prisoners of war were still absent in large numbers and it was natural that some land should be reserved for them. Later, the acreage of state holdings began to expand and state farms were set up in increasing numbers. Most of the land confiscated from recalcitrant peasants went to increase the holdings of the State, which also bought up the richer peasants whom it had made bankrupt. The state farms enjoy special privileges, exceeding even those of the collective farms. What is most curious, labor legislation, including official minimum wage rates, does not apply to them. The work on them is organized on lines similar to that on the collective farms. They are expected to be models of superior organization and efficient farming.

Appraisal of Collectivization

From the purely technical point of view, some of the changes brought about by collectivization could bring great advantages, especially in areas where cereals and other staples had been and would have to remain the principal crops. Units too small for efficient farming could be combined into larger ones. The very size of the farms could be the subject of a rational decision. Livestock could be better housed, fed, and cared for. The number of work animals, which often eat up most of the proceeds of the very small farms, could be cut down to an economic level. The bad amortization of farm machinery could be eliminated by a more efficient use of the machines and by the prevention of overstocking. Investments could be channelled rationally and could be fitted into a national plan. New techniques in farming would be easier to introduce. The costly and lengthy procedure of training a large number of would-be farmers for a wide variety of skilled tasks and managerial functions could be eliminated. The risky way of

trying to persuade stubborn farmers to improve or change their methods could be done away with. The collective farms could be run by expert technicians, relying on the authority of and carrying out the instructions of the central government agencies. The farm workers would cease to be jacks-of-all-trades. Working under expert supervision and being paid on a performance basis, they could execute greatly simplified tasks and constantly increase their output.

Competition among the brigades of the collective farms and special drives, similar to those in industry, are now in full progress on collective farms. Indeed, the aim of collectivization seems to be to destroy the special characteristics of the agricultural workers and make them similar in outlook to factory workers.

In spite of its obvious technical advantages, the idea of collective farming has no appeal in Eastern Europe.

The reason for the peasants' refusal to accept the system is that it reintroduces with a vengeance the system of large estates of hateful memory. They reject it, even though it might lead to a higher aggregate output for the community and to higher living standards for themselves, because it takes away something they value more than eventual material gain.

The large estate was hateful to the peasants because through its very existence it limited their possibilities of rising in their own society through the acquisition of land; it gave them the feeling of helplessness against the all powerful landlord; it perpetuated an oppressive atmosphere in a society and state where the effects of the master-servant relationship had a tendency to persist with a pervading force in spite of what the law said.

It is right to remember that, with all its faults, the old order was far from totalitarian regimentation and under it conditions were not uniformly bad. In each of the countries surveyed agricultural laborers were free to move, could choose their employers, and could better their conditions. They had increasing protection against their employers by law. Even where conditions were worst, they had some freedom of organization and could voice their aspirations and grievances. In four out of the six countries landless laborers were not an important group, and owner-occupiers prevailed. Most of these were also poor and their opportunities limited, but they felt equal or more than equal to other groups.

Now on the collective farms the peasants are all reduced to the status of the former farm servants, but with no chance of leaving or rising in their own community and with little influence in running the collectives. Once they felt helpless against their landlords, but their present helplessness is much greater because with exacting minuteness their lives and actions are controlled by distant bureaucrats who are not of their choosing and whose actions they cannot influence. Of councils and committees there are, to be sure, a large number. But all that voting means is endorsing the

candidates nominated from above, and all that the councils and committees do is to endorse the actions of a small group of people imposed by Soviet power and kept in position in the shadow of arms. Yugoslavia is a paradoxical exception.

Under Communist attack the unions of organized labor, the old civil service, and the professions went down in Eastern Europe without protracted serious struggle. The peasants were able to put up stronger resistance because, living on largely self-sufficient farms, they had some protection against that most powerful potential instrument of oppression—the modern industrial State. Their accustomed low living standard was a help because it made adjustments, if anything, easier. But they were fighting against hopeless odds.

The policy of collectivization was not announced in the different countries before the Communist Party acquired complete control of the administrative and economic machine. There is now no free sector where one can eke out an existence while preserving one's independence. There is no moving frontier which promises refuge to dissidents in opened-up lands. The State is the master of all means of employment, of all means of livelihood, and sets its terms, both economic and political. Not to comply means reducing oneself to the state not of a beggar, because even begging is subject to a license, but to that of an outcast without any protection. The slightest overt act of dissent, not to mention revolt, means loss of job, the concentration camp, prison, or death.

In the case of the peasantry the possible harmful effects of a suicidal revolt, like the one they staged in the USSR, by killing off their livestock and by refusing to plow up their lands and deliver their crops, were forestalled by the establishment of the tractor stations and state farms. Spread all over the country, the number of stations is getting so large that, should a showdown come, they would be able to cope effectively with the most essential work. Meanwhile the state farms may be counted on to supply the few vital industrial centers.

Pushed with great force, collectivization is making headway. In Bulgaria, where genuine producers' cooperatives had long existed, about 43 percent of the arable land was collectivized at the end of 1950. In Yugoslavia the process has been halted and the figure was 25 percent; in Czechoslovakia it was about 20 percent, while in the other countries it was smaller and varied between five and 10 percent. A large proportion of the collective farms was established in the districts from which the Germans had been expelled, and a great number of the members were people with very little land or none.

At the same time, after a flying start in 1945–46, agriculture was making but little progress. In all countries, agricultural production was below prewar in 1949 and even more so in 1950. The percentage achievements

of agriculture make a poor showing in the reports on the progress of the plans if compared with the impressive record of mining and industry. The targets set for agriculture by the five and six year plans now in progress are modest in comparison with those set for industry, or with the prewar output of agriculture, when the efficiency level was admittedly low. At the same time, with the great allocations for investments swallowing up a large proportion of the net proceeds of the collective farms, the standard of living of the members of the collectives is about equal to that of the better paid farm servants before the war.

On the authority of Stalin, the collectivization of Russian agriculture was a more exacting and dangerous struggle than the last war, although the Russian peasants were more submissive than their Eastern European colleagues and had some tradition of collective farming. In the USSR, with its vastness, great untapped natural resources in soil, and primitive methods of cultivation, collectivization and the subsequent mechanization of agriculture held great promise and brought decided improvements.

In Eastern Europe most of the peasantry was independent and those who did not own land aspired to become owner-operators. Self-reliant, these peasants have no liking for collective enterprises. At the same time both the potentialities and the promise of large-scale farming and mechanization are limited. The per acre yields were in general higher than in prewar Russia and to raise them demands human qualities which Communist policies blandly ignore.

Hitherto these countries looked for their salvation to products which, by requiring greater care and much labor, could provide more employment for their large agricultural population and produce greater value per unit of their limited acreage. The large collective farms are ill-suited for those products; and while large scale mechanization might bring about greater efficiency and greater output per man employed, it will also increase considerably the already large surplus population in agriculture. This makes forceful collectivization of Eastern European agriculture a policy of doubtful value, even if other objections to it are brushed aside as "emotional."

EFFECTS OF FARM PRICE CHANGES ON EFFICIENCY IN FARMING*

WALTER W. WILCOX
Library of Congress

ECONOMISTS for years have utilized partial equilibrium analysis to predict changes in supply or changes in the amount taken by consumers as a result of particular price changes. More recently we have attempted to evaluate the effects of government price support programs by the simple application of this partial equilibrium analysis—usually with unsatisfactory results.

The difficulty is twofold: (1) We forget to examine into the equilibrium position of the producers irrespective of the price change under consideration, and (2) we disregard the dynamic effects of a price change over time which operates primarily through the income effects on farm family decisions.

If we are to use economic analysis to predict correctly the effects of general farm price changes relative to factor costs, we must give far more attention to the existing resource use patterns on farms—and study far more carefully the motivating factors which cause farm families to shift their combination of production factors and supply schedules over a period of time.

Our usual predictions of the consequences of price changes are based on an assumption of approximate equilibrium at the previously existing prices. This is our first and most common mistake. Actually, most farms are far from being in equilibrium utilizing the best known technology (production factors are not so organized that marginal cost = marginal revenue). When one examines the disequilibrium situation (from the economic point of view), one finds three factors about equally important:

(1) Partially because of uncertainty, there is a shortage of capital and credit needed to bring the production factors into the most economical combination.

(2) Farm families have a cultural approach to farm production which dulls or even blinds the farm operator to the income possibilities of employing new forms of capital, or in rare cases, of substituting income for leisure.

(3) There is widespread ignorance of the production alternatives available, including alternative employment opportunities for the farmer's own labor.

In spite of the great improvements in farming in the past two decades, many farmers are still combining their resources so poorly from a technical

* Paper read at a joint meeting of the American Farm Economic Association and the American Economic Association in Chicago, December 30, 1950.

point of view that *increasing* rather than decreasing physical returns are associated with increased use of the variable factors—production supplies in the case of farming. In the Midwest, where I am most familiar with farming practices, increased applications of fertilizer on most farms would bring a higher return per additional dollar invested than the present marginal expenditures in crop production. Most farmers are still operating in the area of increasing rather than decreasing returns in shifting a larger part of their cropland to high yielding legumes with appropriate soil amendments and plant nutrient additions. Few farmers make as large investments in improved strains of breeding stock to upgrade their herds and flocks as would be profitable. Few farmers make the investments in disease and pest preventives that are profitable under "normal" cost-price relations.

In the South, where over half of our farms and farm families are located, I am advised that the disequilibrium position of farm firms is even greater. The disparity between the most profitable organization of the production factors and the existing organization is so great that substantial changes in the kind or type of farming are required to bring it into anything approaching an economic proportioning of the production factors. The problem of efficient organization of agricultural resources in the South, as Dr. Hendrix points out in the paper which follows, is complicated by the wide shift in farming required to bring it roughly into an equilibrium position, by the low level of education of the farm operators who are the entrepreneurs, and by the relatively large capital requirements if the changeover in farming methods is to be successful.

Farm operators in the East and Northeast more nearly approach the classroom illustrations in their farming operations, but even here, I am told, farmers typically fail to make profitable investments in soil amendments and plant nutrient additions to their pastures and fail to make profitable labor and capital expenditures in woodland management.[1]

Other evidence of existing disequilibrium in agriculture is found in the scale and organization of farms within and between different communities. One finds the poorer, less productive lands in the general farming areas of the United States organized into smaller operating units than the more productive lands in the same community. The same situation holds true for different areas. An example is the smaller average farm size in Missouri as compared with the neighboring state of Iowa, where the land is far more productive. The average return per hour of farm labor in Missouri is much lower than in Iowa. Widespread malallocations of resources exist, viewing resource use on either a community or area basis.

Although the development of economic models increases our precision in analysis, all static economic models of necessity abstract so much from real-

[1] See for example John D. Black, *The Rural Economy of New England*, Harvard University Press, 1950.

ity that when one has mastered the appropriate static 1951 model, he has only a beginning on the direct economic motivations of the entrepreneur. Where commercial agricultural production is carried on by about three million different entrepreneurs, and where all decisions regarding the use of the income stream and the credit resources are made in a household vs. farm production context, *static models explain even less of the total picture.*[2]

In view of the evidence of widespread disequilibrium in the economic model sense, we must conclude that the critical factors in the adjustment of most farm plans are the capital and credit position of the family, the strength of cultural forces and the knowledge of the alternative production techniques.[3] At this point we also need to bring into perspective the point which is more fully developed in Dr. Hendrix' paper, namely, that production innovations are being developed at an increasing rate in recent years, innovations which would be profitable for large numbers of families to adopt irrespective (within wide limits) of the level of farm product prices. Innovations of this character are the development of chemical weed and insect control sprays, improved strains of seeds, and power and tillage machinery which permits more timely and thorough preparations of the seed bed for crops. Innovations in mechanical equipment, such as the fertilizer attachment on the grain drill and the field forage harvester, also make new production (or harvesting) practices economical, irrespective of the level of farm product prices. At any particular time only a very small fraction of the farmers have adopted the newer production innovations which are profitable under existing factor-product price relations.

With this very brief discussion of the critical differences between the real agricultural world and the glimpses one gets of small segments of it from economic models, we must turn to an examination of the effects of price changes on efficiency in farming.[4] For this purpose several typical farm situations will be explored.

Large-Scale and Large Commercial-Family Farms. We shall consider first the large-scale and large commercial-family farms where the income and capital position are most favorable. The large-scale farms make up only two percent of all farms, but produce 25 percent of the farm products marketed. These farms employed an average of 7.2 workers and had an

[2] For an extensive but inconclusive discussion of the application of theoretical models to farm production research, see the group of papers on this topic read at the 1950 annual meetings of the American Farm Economic Association: this *Journal*, November, 1950. Part 2.

[3] Again, keep in mind that this paper is focused on the problem of the impact of general farm product price changes relative to factor costs on resource use in agriculture. When the relative prices of two farm products, such as wheat and corn, change, the production response is prompt on those farms where these two products are close competitors for resources. The same is true for competitive production supplies such as soybean oil meal vs. cottonseed meal.

[4] In this paper resources are regarded as used efficiently when marginal costs, utilizing the best adapted technology, are equal to marginal revenue for the individual firm, and the marginal returns to comparable resources are equalized between industries. Inefficiency exists from the economic point of view when these conditions are not fulfilled.

average value of products sold and used of $39,217 in 1944. About eight percent of all farms were classified as large commercial-family farms; average cropland harvested per farm was 193 acres, workers per farm averaged 2.5, total investment per farm was $33,203, and value of products sold and used was $10,484 per farm.[5]

These two groups of large farms, the upper 10 percent, operate under conditions which most nearly approximate the postulates of the economic models. The income stream is sufficiently large to take care of the more urgent family needs without encroaching on funds needed for business operation. (These farmers are the Buick and Cadillac owners reported in the magazines.) The credit position of these farmers (except in prolonged depressions) is such that they can borrow at any time in the amounts necessary to take advantage of production innovations which are profitable. How do general product-factor price changes affect the organization of their businesses? A general price rise should make it profitable for them to use more resources in farm production than was profitable before the price increase. They have an economic incentive to invest in new capital goods and hire more labor to increase the output of their firms.[6]

Actually, many of these large farms are not in economic balance at any particular time and the price increase acts somewhat as an electric shock, causing the operator to change outmoded production practices which were uneconomic even before the price increase. Thus, as a result of a combination of motives, more capital resources and possibly more labor are engaged in production on these farms after a price rise than before. But output does not increase as much proportionally with a general increase in farm product prices on these large farms as it does on the medium size farms. Limitations of capital, cultural inhibitions, and ignorance of available alternative production techniques are at a minimum on this group of large farms. Of all the farms, they are most nearly in balance before the price increase, hence they have fewer opportunities to increase output profitably.

Economic Process of Increasing Output. It will help us understand the economic processes if we look rather closely at the form of the increased capital and labor on these farms. Particular production techniques require capital and labor in almost unique combinations. Thus, in producing a crop, we use one man on a tractor and follow a specific sequence of operations in the preparation of the seedbed and in the harvesting operations. If crop prices rise, farmers change the quantities of resources used in carrying out the usual sequence of operations but little; rather, they introduce

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[5] For number of farms by economic class and similar data for each class of farms, see U.S.D.A. Tech. Bul. 1019, Table 2.

[6] This discussion omits consideration of the effect of these price changes on scale of operations which could be increased by buying or renting more land, thus displacing other farm families.

new technologies which offer promise of increasing output.[7] Some of these may be spraying the crop for weed and insect control, reducing the spacing between the rows and increasing the rate of seeding and use of fertilizer.[8] A similar situation exists in the means by which livestock products can be expanded in response to higher prices. Except in the production of meat animals, where they may be fed to heavier weights under the stimulus of higher prices, additional capital and labor used in livestock production on these large farms almost always take the form of introducing new technologies as in crop production.

Effect of a General Price Decrease. A general decrease of farm product prices does not have the opposite effect of a general price increase on these large farms. The 1949 situation is a case in point. Farm product prices declined while production costs were well maintained or increased. The decline was of too short duration to furnish evidence on this point, but the nature of the resource combinations used in farm production in recent years indicates that reductions in the use of capital and labor would not be economic except under catastrophic price declines.

It is in this area that our traditional teaching practices using moderately upward sloping static marginal cost curves are most misleading. Farmers do not vary their output by intelligently moving to the right or left on static cost curves. Detailed analyses of midwest farm businesses have convinced the writer that in view of the state of our technical knowledge of input-output relations and the production uncertainties in producing crops and livestock—where these businesses were using the best known production practices at 1948 price levels—reductions in capital and labor inputs in 1949 would be uneconomic. The reason for this is simple—the newer capital and labor using technologies such as seed treatment, closer spacing of corn rows, worming of pigs, weed spraying, and balancing rations with fortified protein and mineral supplements are cost reducing to the extent that they are profitable under any level of product prices which permit the producer to stay in business. Even our standard classroom examples, level of feeding (except for feeding meat animals to heavier weights) and rate of use of fertilizer are less flexible than usually assumed. When health of animals or weather uncertainties are taken into account, one cannot find evidence to indicate that it would be profitable to make changes because of product price decreases, if the most profitable level of feeding

[7] These new techniques or technologies almost always require additional capital and labor, but since new combinations of capital and labor are involved we have new production functions.

[8] Recent technical studies in the use of fertilizer on cultivated crops indicate that a whole complex of new production techniques are needed to obtain the most profitable combination of fertilizer and other factors. In North Carolina, *e.g.*, applications of five to 10 times as much nitrogen as is customary is profitable on corn if at the same time the spacing between the rows is decreased, the rate of planting increased and a part of the nitrogen is applied as a side dressing when the corn is two feet high.

or fertilizer use had been practiced under the higher level of prices.

Recent data on the response of corn yields to nitrogen applications in North Carolina indicate that when the cost of nitrogen is 12 cents a pound and corn is $1.60 a bushel, an application of 120 pounds of nitrogen is profitable under either favorable or dry weather conditions. Higher nitrogen applications give no further yield increases in dry years, and give such small increases in favorable years, that corn should sell for $2.50 a bushel

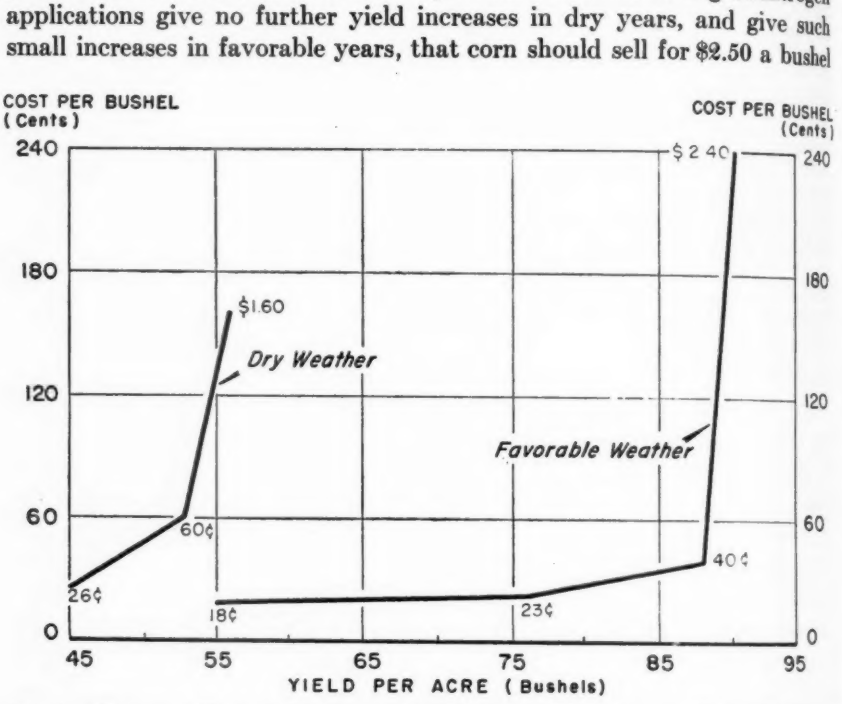

FIG. 1.—MARGINAL COST OF ADDITIONAL CORN PRODUCED PER ACRE IN NORTH CAROLINA, 1944–1948, BY 40-POUND UNIT APPLICATIONS OF NITROGEN RANGING FROM 40 TO 160 POUNDS PER ACRE

When the cost of nitrogen is 12 cents a pound and corn is $1.60 a bushel, it is profitable to apply 120 pounds of nitrogen per acre under conditions of either favorable or dry weather; and under favorable weather conditions applications of 120 pounds are profitable with corn at $.40 a bushel according to these experiments. Since another 40 pounds of nitrogen increases yields only two bushels an acre in favorable weather and has no effect in dry weather, more than 120-pound applications are not recommended. (Data from No. Car. Exp. Sta. Bulletin 366)

to justify higher nitrogen applications. On the other hand, the marginal cost of producing corn with 120-pound applications of nitrogen in favorable years is only 40 cents a bushel, which permits a sharp drop in the price of corn without making a reduction in the use of nitrogen profitable (Figure 1).

We may conclude our analysis of the response of large farms to a general drop in farm product prices relative to factor costs with the observation that our classroom economic models would lead us to expect a reduction

in farm output, and in fact a reduction may occur. Except in rare cases, however, empirical data on input-output relations do not indicate that their income position is improved by reducing production.[9]

Adjustments on Medium, Commercial-Family Farms. The medium, commercial-family farms respond to farm product price increases or decreases in much the same manner as do the large farms. The important differences are associated with the poorer income and credit position of these farmers, their greater tendency to look on farming as a customary way of earning a living rather than as a profitable business, and the more limited information of the operators regarding alternative production techniques available to them. Because of these limitations, medium commercial-family farms as a group are farther from an economic equilibrium position (assuming absences of credit rationing and perfect knowledge) than the large farms. They are farther behind in adopting the new technology. Another factor enters on many of these farms—the family labor supply is excessive in terms of efficient employment opportunities available on the home farm.

Income Effects of Price Increases. It is on this group of farms, approximately 20 percent of the total, that the income effects of price increases become important. Families on these farms, where the value of farm products sold and used in 1944 averaged $4,658, and the cropland per farm averaged 104 acres, are characteristically short of income out of which to make capital investments in the farm business, to purchase durable consumer goods for the home and to provide the educational and other cultural opportunities desired for the children.

A general farm product price rise which increases the income available to these families raises their horizons as to what may be possible for them in life. Not only do they have more income available out of which to make capital investments, but they revise their attitudes toward using credit (and credit agencies revise their attitudes on size of loans which are prudent). The increased income appears to act as an electrical charge for many farmers, stimulating them to undertake production innovations which were profitable earlier, but which were not undertaken because of inertia.

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[9] One of the situations where the slope of the marginal cost curve indicates a desirable variation in fertilizer applications depending on the price of the product is in potato production in Aroostoock County, Maine. See Black, Clawson, Sayre and Wilcox, *Farm Management*, Macmillan, 1947. These data are obsolete, however, as control of insect damage with new type sprays has greatly increased the capacity of potatoes to utilize additional plant nutrients. Without doubt some resource combinations have moderately sloping marginal cost curves even though they are in a minority. Crops grown under irrigation more frequently fulfill the requirements for moderately sloping cost curves than crops grown under natural rainfall conditions.

This phenomenon of general steeply inclined marginal cost curves in farm production as increases in output are attempted by increasing variable factors relative to the fixed factors—land, cows, etc.—does not preclude moderately sloping supply curves for particular commodities such as corn, wheat, milk, and eggs. Most of our variations in supply of a particular product are the result of product substitution in response to relative price changes on farms where these products are closely competitive. See footnote 3.

A large number of changes take place both in the household and in the farm business, as a result of this increased income. Since many of the output increasing and cost reducing technologies are also labor saving (*e.g.*, motor vs. horse power, power-operated harvesting machinery, and electrical equipment at the farmstead), the substitution of power and machinery for labor takes place rapidly. The family labor supply becomes even more excessive on many of these medium commercial-family farms, and either a larger farm operating unit is organized or some members of the family seek off-farm employment.

The increase in production which occurs on these farms as a result of general price increases as on larger farms arises almost wholly out of the adoption of new production processes requiring the use of additional capital. These are made possible by the larger income stream and the easing of self-imposed and lending agencies' restrictions on credit use. They also result in part from an increased awareness of the newer production techniques available. (The increased income, *e.g.*, may permit these families to get a new radio, a television set, or a new car, which in turn results in their getting more information regarding recommended farming practices out of the atmosphere or in meetings.) If we were to attempt a diagram of the process by which production is increased on farms as a result of a price rise it would take the form of a sequence of almost perpendicular marginal cost curves moving to the right as new production functions are adopted.

These cost curves shift downward rather than upward as we move toward the right increasing output. This gives us increasing disequilibrium in the short run with costs falling as product prices rise and increases in output are stimulated. While individual farms have carried this process to the point where the new technologies result in higher costs, for the great majority of the farms income, credit, and cultural limitations set the limits on output expansion rather than rising costs utilizing the best adapted technology.

Effects of Price Declines on Medium Commercial-Family Farms. As pointed out in the case of the larger farms, these farms cannot improve their economic position to an important degree by reducing production when product prices fall relative to factor costs. But they may reduce production for other reasons. Financial agencies restrict their loans and the families themselves voluntarily restrict their use of credit under the less favorable income situation. Even though income and credit resources are adequate they may reduce their use of production supplies such as fertilizer and insecticides—either because of a mistaken belief that they can improve their income position in this way, or because their interest in farming is dulled by the discouraging income prospects for farmers.

It is the writer's observation that those farmers who have most to gain

by the maintenance of their use of production supplies when farm product prices fall are the first to reduce their purchases. They are the farmers who have the least technical knowledge about input-output relations in farming, the smaller incomes and, hence, the greatest pressure on the income stream for family living needs, and they have the least basis for credit. When the price of eggs or hogs falls, the typical reaction of many of these farmers is "what the hell's the use" of buying high-priced protein supplements if "they" are going to cut our prices for these products. These farmers neither have the technical information nor the interest to work through a cost and returns analysis. In contrast, the farmers who are feeding the best balanced rations and are using the heaviest applications of fertilizer—the ones who might improve their economic position somewhat by a reduction in purchased proteins and fertilizers—maintain their customary practices when farm product prices fall because they believe their particular practices are the most profitable under a wide range of farm product prices. They also have the income or credit resources with which to maintain their purchases of these supplies.

Applying the same analysis to the effect of a farm price drop on the substitution of capital for labor in farm production, we find that lower farm prices tend to hold more labor on these medium family farms than a higher level of prices. The introduction of labor-saving machinery is slowed down because of income and credit limitations pointed out above. Half of these medium commercial-family farms employed no hired labor, and the average wage bill in 1944 was only $226.[10] The more typical situation is an excess of family labor in normal peace-time years when modern power and machinery are used in the farming operations. This excess family labor seeks and obtains off-farm jobs when they are available.

When low farm product prices and incomes restrict the introduction of labor-saving machines (because of the capital investment problem), the family labor is retained on the home farm even though the returns per hour realized for this labor are extremely low. It is the exceptional family that analyzes the capital-labor problem on the medium size family farm in a rational economic manner and uses credit to substitute capital for family labor until marginal capital costs equal the returns the family labor could earn in off-farm jobs. In spite of the fact that low farm product prices result in low returns per hour of labor, which should increase the incentive for boys to leave the farm, there is at least room for reasonable doubt as to whether this type of motivation is stronger than the labor holding effects outlined earlier.

Adjustments on Small Commercial-Family Farms and Small-Scale Farms. These two groups of farms account for almost half of the full-time farms in the United States. The average cropland harvested on the small family

[10] U.S.D.A. Tech. Bul. 1019, Table 25.

farms was 46 acres, with a value of products sold and used in 1944 of $1,874. The small scale units averaged only 22 acres of harvested cropland and $825 value of products sold and used in 1944. One can only explain the existence of these farms (when they are operated by able-bodied individuals of working age—approximately two thirds of the total) in terms of the failure of our economic system to allocate resources in line with marginal analysis.

Income and capital limitations in entire communities have prevented the children from getting adequate school training, needed medical attention, and nutritious diets. The poverty conditions under which they have been reared keep them from knowing about the employment opportunities outside their home communities and from being sufficiently educated and trained to take advantage of job opportunities when they are available. The low level of income on these small farms and its related effects result in the most backward production practices to be found in the United States.

At any level of farm product prices and factor costs the economic adjustment for the families on these small family farms and small-scale units is either to enlarge their size of business and adopt improved farming practices or shift to nonfarm employment. Yet we had roughly 2.6 million farm families in 1945 who had not made this adjustment. How do changes in farm product prices affect the production and resource use decisions of these families? Some agricultural economists have dismissed the price effects on this group of families, especially those on the small-scale units, as unimportant, because they produced such small quantities of farm products per farm.

The disequilibrium position of these farms is so great and the malallocation of resources in these areas of predominantly small farms so enormous that any price changes which tend to loosen the grip of the poverty cycle would appear to be a force for improving efficiency. Conversely, any changes which tighten the grip of poverty on these families intensify and prolong the existing inefficiency and malallocation of resources. *Half of the labor in agriculture is found on these small farms.* If the remaining labor on these farms could be forced into taking nonfarm jobs by low incomes they would have left the farm long ago—a further lowering of prices will not induce the needed resource adjustment. Conversely, there is no sound basis for believing that higher prices will prevent needed adjustments. Higher prices and incomes should make the adjustment problem easier. But we must look to other social and economic measures to correct the malallocation of resources which is occurring by the continued existence of this large number of low-productivity and low-income farming units.

What over-all conclusions can one draw from the foregoing discussion? Several occur to the writer. Prices perform a very useful role in allocating resources between closely competing farm products, but they are much

less powerful in inducing a rational allocation of capital and labor either within agriculture or between agriculture and other industries. We are misleading ourselves as well as others when we use static economic models to reach definitive conclusions about the effects of general price changes on the efficiency with which resources are organized.

This analysis also suggests that the manipulation of existing data using formulas based on our equilibrium models gives us answers which cannot be useful, because the assumptions of the equilibrium models are not approximated in real life. And the writer at least is skeptical about the practical value of the current emphasis on refinement of the static production and resource substitution functions for existing technologies. The pressing economic problems in production in this generation are associated with and grow out of the social process of incorporating the continuing stream of new technologies into the farm production process.

AVAILABILITY OF CAPITAL AND PRODUCTION INNOVATIONS ON LOW-INCOME FARMS*

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SOME of the most important opportunities for increasing economic efficiency in agriculture lie in highly discrete and complex resource combination changes such as the conversion from cotton to livestock (or to cotton-livestock) systems of farming; from present to improved kinds of crops and livestock; from animal to tractor power and machinery; and from hand to machine methods of performing tillage and harvesting operations. Such changes, in contrast to simple quantitative kinds, cannot be readily analyzed in terms of the principle of *diminishing returns*. Rather, they constitute changes in technology, or fundamental changes in combination or organization of resources which for purposes of economic analysis must be treated as production innovations, following the modern economic usage of this term.[1]

Such resource combination changes underlie most of our progress in agricultural production. Historically, they not only have helped to forestall the tendency of population to outrun its means of subsistence, but they have made possible the release of large numbers of people for production of the many goods and services that characterize our modern culture. Because of their fairly complex nature, however, many innovations give rise to economic problems not encountered in continuous or purely quantitative resource combination changes. One of these problems stems from the necessity to bridge wide resource gaps to make some of these changes and to the pressure that this creates upon the usual capital supplies. Closely related is the problem of increased uncertainty associated with many innovatory changes, particularly with those requiring new skills and entrepreneurial abilities or a large increase in investments and in the investment period.

This paper is an attempt to analyze these problems, its orientation being largely about the agriculture of the South. It is an examination in particular of the hypothesis that *if capital were more readily available, then the rate of*

* Presented at a joint meeting of the American Farm Economic Association and the American Economic Association, Chicago, Illinois, December 29, 1950. This is a revision of a paper presented in the seminar on Economic Efficiency, sponsored by the Social Science Research Council at the University of Chicago, June 27 to August 11, 1950. The paper has therefore benefited from the helpful suggestions and criticisms of the seminar members. It has also benefited from materials developed during the writer's recent participation in a study of Underemployed Rural Families for the Joint Committee on the Economic Report, U. S. Congress. The writer alone, however, is responsible for the paper, including any fallacies in the ideas and facts presented.

[1] J. A. Schumpeter, *Business Cycles*, Vol. I, pp. 85–86; also Oscar Lange "A Note on Innovations," *Review of Economic Statistics*, Vol. XXIV (1943), pp. 19–25.

production innovations, or of technological progress, by low-income farmers would be greatly accelerated. Of course, it can be easily demonstrated that additional capital is necessary to many innovations. On the other hand, casual examination of the factors affecting innovations and of the possible uses or misuses of capital suggests that our hypothesis without further elaboration and refinement may be of little, if not of negative, value for policy purposes. Additional capital, while essential to many innovations, may not be a sufficient condition. If not, then efficient use of resources requires that we know under what conditions more capital will increase the rate of economic progress. Under what conditions will it fail unless supplemented by other special programs? And under these conditions what kinds of supplementary programs are needed to insure the most effective use of additional capital funds?

In the first part of my paper I shall briefly review some of the major distinctions between innovations and other resource combination changes, noting particularly differences in their capital and other resource requirements and in determinants of the change.[2] Such review will show the basis for the hypotheses advanced in the latter part of this paper and will help to prescribe the questions and conditions for their factual investigation.

Capital Requirements of Innovations

An innovation is a resource combination change of such complexity that it cannot be readily described in terms of a change in the mere intensity of resource use or as a movement to the right or left along a given production function. Instead, it involves changes in resources and in production relationships that we can describe only in terms of a new production function. It is a change to a new production function made to improve the firm's income or profit position or to reduce uncertainty (or, for nonmonetary reasons, consideration of which is outside the scope of this paper). The opportunities for these changes are being rapidly created by advances in technology, also by market changes that make it profitable to adopt older technologies that were previously uneconomic.

In recent literature innovations have been analyzed in terms of their effects upon scale of operations,[3] and as to whether they save labor or capital, or effect an economical substitution of capital for labor or vice versa in the production process.[4] The problem of capital requirements, however, does not arise merely because an innovation requires a larger scale of operations or because it effects an economical substitution of capital for labor in the production process. The needs for additional capital arise because

[2] This review is based largely upon interpretation of the late Professor Joseph A. Schumpeter's *Theory of Economic Development.*

[3] Earl O. Heady, "Basic Economic and Welfare Aspects of Farm Technological Advance," this *Journal*, May, 1949.

[4] Oscar Lange, *op. cit.*

the innovation requires, even to begin operations, large quantities of additional resources. In other words, many innovations have an early factor using period before their operation is begun, and are factor saving or output increasing only when viewed over the lifetime of their operation. Therefore conceptually, at least, an innovation can require large capital additions yet both decrease scale of operations and effect an economical substitution of labor for capital when viewed over the whole lifetime of its operations. In short, we have no general principles to guide in determining the nature of the capital requirements of shifting from one technology (or from one production function) to another. Rather, determination of capital requirements of innovations, whether for more or for less, must be made for each specific kind of innovation. In terms of their capital requirements we may classify innovations as follows:

(1) Innovations that require for economic operations[5] less capital than is in the present system.
(2) Innovations that require little or no change in amount of capital.
(3) Innovations that require much more capital than is in the present system.

For changes of the first two kinds, the supply of capital is not the limiting or strategic factor. These innovations, therefore, can be adopted more easily than those requiring large capital additions, possible exceptions being kinds requiring unusual skills or management abilities. Innovations of these kinds include adoption of improved crop varieties, the simple substitution of one kind of crop for another (as peanuts for cotton and corn during the war years), use of improved insecticides, and many others, including many very simple changes. These changes pose no special capital problems. Instead, where such production improvement opportunities occur, their exploitation can be an important step to increasing income and thereby to accumulation of the funds needed for adjustments requiring large capital additions.

Many changes that at first appear simple, however, may be found upon examination to be far more complex. Adoption of hybrid corn on Georgia farms is a good illustration. Percentagewise, the increase in yields from hybrids is as high in Georgia as in the Corn Belt. But with a base yield of only 12 to 14 bushels, the increase in returns over costs are still negligible. Where combined with the application of three to four times as much fertilizer as many farmers now use, with closer spacing of plants, and with good tillage practices instead of with the customary late deep plowing, the hybrids yield highly satisfactory results. Conversely, within limitations imposed by present varieties, present spacing of plants, and the late deep plowing, farmers with 12 to 14 bushel yields may be applying about as much fertilizer as it will pay them to use. In other words, within these

[5] The term *economic operations* is used here to mean a substantial improvement in the firm's income position, whether operations are at or far short of the optimum scale for the new technology under the factor and product prices that prevail.

limitations, they are operating near the optimum level and can advantageously use additional fertilizers only if accompanied by a complex of other changes that for economic analysis can readily be treated only as a change in technology.

Many major farm adjustment opportunities (particularly in the South), of course, lie in innovations that require for economic operations large increases in capital investment. It is for these adjustments that the problems of capital are acute. This is not to deny that more capital can often be used to large advantage for resource changes of purely quantitative kinds. In the case of "continuous" or purely quantitative changes, however, if additional resources are needed, increases can be made to advantage in however small quantities the additional resource is available. This characteristic is of considerable advantage where there is capital rationing of an involuntary nature. It makes possible the profitable investment of very small increments of capital, giving rise to a system within which is contained not only an incentive to additional investment, but a possibility of increasing the rate of savings or of capital accumulation out of income. Furthermore, purely quantitative adjustments require only minor changes, if any, from routine production methods. They therefore involve little uncertainty as to adequacy of available skills and management abilities.

Meeting the resource requirements of innovations that require large increases in capital out of internal savings poses exceedingly difficult problems for low income farmers, no matter how profitable the innovations, or no matter how helpful they might be in weathering economic uncertainty. Additional investment in these resource combination changes, short of that needed for an economic scale of operations, obviously places the firm in a lower income position and only accentuates the difficulties of internal saving.

Some major innovations may be made without *appreciably* disturbing the production relationships that apply to other parts of the farming business. For these, additional capital is needed for only the single change. Often, however, a new machine or technology is economically desirable only if accompanied by other important resource combination changes. In still other cases, they so radically alter existing economic relationships and margins as to set in motion many other changes, which although not essential to the innovation at first, are essential to the maximization of income. In the Piedmont in Georgia, for example, a common size of cotton-type farm operated with mule power and machinery is one having about 40 acres of cropland. Conversion from mule to tractor power and machinery, using sizes in which these are available, is generally considered economically inadvisable by farmers with less than 60 to 65 acres of cropland, and the optimum acreage is believed to extend much beyond this range, assuming the supply price of land is constant. This means that conversion from mule to tractor power and machinery requires not only additional capital for

the power and machinery but additional land and appropriate additions to other production resources. Substitution of tractor for mule power and machinery may also appreciably alter cost relationships between low and high labor requirement crops, say between feed crops and cotton, thus creating conditions favorable for changes to livestock production. Indeed, on some farms conversion from mule to tractor power and machinery may be economically feasible only if accompanied by changes both in size and in type of farming, and in a whole complex of other farming practices. On these farms, instead of only $2,000 to $3,000 additional investment to change from mule to tractor power and machinery, three to five times these amounts, or $10,000 to $15,000 additional investments plus large increases in operating capital are needed before any additional capital at all can be profitably invested.

On farms where the *possible* level of internal savings is exceedingly small (as it is on all low-income farms) such adjustments are obviously impossible without resources from outside, through either grants or credit, no matter how economically desirable the innovations are. Under the assumption of perfect competition and mobility of resources, the additional capital needed would of course be obtainable through the credit system, the rate of interest serving as an equilibrating factor in establishing a new equilibrium based upon any change in production opportunities. The concept of perfect knowledge implicit in the notion of perfect competition, however, can mean in a world of constantly increasing knowledge little more than common knowledge. In agricultural areas where little progress has been made, the common tendency is to identify performance as potentiality. This tendency is often strongly reinforced by reference to the failures of many attempted adjustments, which, instead of being inherent to such adjustments, are due to the innovator's lack of enough resources, thereby having their basic causes not in the new systems but in the old.

Capital rationing is further increased by our tendency to relate the need for resource changes solely to changes in prices, assuming the same technology. The need for resource changes of purely quantitative kinds is solely a function of price changes, the quantity of resources needed to maximize income declining as relative prices of products decline, and increasing under the opposite conditions. In the case of change of innovatory character, investment in additional resources is often warranted in spite of declining prices. For example, in the South, studies indicate that large new investments in improved pastures will help livestock farmers shift to a lower cost schedule, enabling them to withstand better appreciable price declines.[6]

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[6] Because of rapid advances in technology and lags in adoption of improved farming techniques, much production in agriculture is conducted under what in essence is increasing returns.—See T. W. Schultz "Economic Effects of Agricultural Programs," *Production and Welfare of Agriculture*, p. 145.

Entrepreneurship as a Requirement for Innovatory Change

In many parts of agriculture, lack of capital is a major obstacle to badly needed production changes of innovatory kind. But were capital available, there could still remain obstacles in low-income areas sufficient to hinder the change. Innovations require not only the existence of capital and of production opportunities of an innovatory character, but persons who have the ability to recognize and size up these opportunities and to carry out the needed resource combination changes. These are a special function, "the privilege of a type of people who are much less numerous than all those who have the 'objective' possibility of making such changes." They are the special function of the entrepreneur.[7]

Entrepreneurial ability is not easily recognized outside of situations affording opportunities to exercise it, and even in these cases it is not easily measured. But it is important enough to our problem to warrant noting a few factors commonly believed to condition its existence and exercise.

Entrepreneurial ability is believed by many people to be related to one's possession of wealth, since it is a factor to the increase of wealth. Possession of wealth is no doubt a practical advantage, facilitating use and development of entrepreneurial abilities. On the other hand, mere possession of wealth as by birth or other fortuitous circumstances is unrelated in principle to entrepreneurial ability. Likewise, success in a business where operations are largely routine and few new major management decisions are required is no guarantee of entrepreneurial ability. Many low-income farmers lack entrepreneurial ability, but as a class probably little more so than their more fortunate neighbors. The latter, however, are able to make farm adjustments that not only widen the gap in their economic status, but which by pressures on product and factor prices actually reduce the economic status of the farmers who are by-passed in the technological progress.[8] The results are the same whether farmers' failure to participate in such progress is caused by factors of topography or location, by their lack of capital, or by their own improvidence and lack of management abilities. In any case it becomes increasingly difficult for them to improve their economic condition out of their own resources.

Scope and time for conceiving and working out the new combinations and for seeing them as real possibilities are necessary to the exercise of entrepreneurial abilities.[9] To this end education (in the sense of formal schooling), time and ability for reading and study, and opportunities for travel are important. Inability to read and write, to receive and understand new ideas except as they are actually demonstrated, and limited opportunities

[7] J. A. Schumpeter, *op. cit.*, p. 75.
[8] See T. W. Schultz, "Reflections on Poverty within Agriculture," *Journal of Political Economy*, February 1950.
[9] J. A. Schumpeter, *op. cit.*, p. 86.

for travel outside the local community constitute important cultural impediments to innovatory change.

Innovations, however, differ widely in the quality of entrepreneurship required for their successful operation. Some require little more than the ability to recognize and choose an improved practice. At the other extreme are innovations that require many new kinds of management decisions, or a high level of entrepreneurial ability. Conversion from a cotton type of farming to dairying is an example. It is a change requiring for the typical cotton farmer a whole complex of new management decisions and many new labor skills, in fact a new way of life. How to attain these abilities poses a problem more difficult in many respects than meeting capital requirements. For unlike physical capital resources, entrepreneurial abilities are personal and are not readily bought and sold by operators of family-size farms. With enough capital or credit a family accustomed to only cotton farming can buy and adequately equip a dairy farm, but it cannot easily buy the entrepreneurial abilities needed to operate it successfully.

In general, these must be acquired mainly through educational processes, including in many cases trial and error experiences and perhaps some early failures in operating the innovations. Special programs of technical and supervisory assistance, such as provided by the Soil Conservation Service and the Farmers Home Administration, can greatly supplement farmers' entrepreneurial abilities, helping them to avoid many costly mistakes. Within the framework of the family farm, however, these agencies can only partially assume the entrepreneurial function. They can be effective only if farmers are first aware of their opportunities and wish to exploit them. Furthermore, programs of technical and supervisory assistance can be effective only if enough capital resources are available for the change.

Application for Adjustment Problems of Low-Income Farmers

Capital and entrepreneurial ability, as well as existence of the appropriate production opportunity, are each essential to innovatory change. Theoretical determination of how these factors are mutually interrelated is confronted with the lack of any clearly defined principles relating to the entrepreneurial factor. Factual determination of their relationship is thus beset from the start with considerable difficulty. But while our theory is incomplete it is still useful for our purpose; also we can make measurements refined enough to serve as a fairly reliable basis for judgments as to the relations between availability of capital and technological progress by low-income farmers. Taking the view that causation is some factor, or factors, that can be changed to yield a different result, we can relate supply of capital to rate of technological progress by means of *ceteris paribus* assumptions. These in turn can be used as guides to factual investigation.

Following from the preceding discussion, differences in the rates of technical progress must be accounted for by differences in the availability of

capital, if the other relevant factors—investment opportunities and entrepreneurial abilities—are essentially the same. Within these limits, farmers who have the freer access to additional capital up to that needed to exploit fully their investment opportunities will make the more rapid economic progress.

It is very important that we carefully distinguish between additional capital investment and technological progress. Additional investment in a new technology short of that needed for an economic scale of operations is worse than no additional capital investment at all.[10] Therefore, it follows that with other relevant factors being the same, the more readily available the supply of capital, the more rapid the rate of technological progress, provided, however, that there is enough additional capital to complete the production change in an adequate manner. Short of this supply, and in the absence of other investment opportunities for which the marginal return of capital is above its marginal costs, increased availability of capital may facilitate misuse and wastage of resources.

Access to capital and investment opportunities being essentially alike, the rate of technological progress will be the greater where there is the greater entrepreneurial ability. As already indicated, we cannot measure with much accuracy differences in entrepreneurial ability. On the other hand, we can reasonably presume that among persons with below fourth grade schooling, for example, entrepreneurial ability is generally more limited than among persons with eighth grade schooling or above. With the short school term that has characterized the schooling of many in the South, many people with less than fourth grade schooling are literate, if at all, by fact of little more than ability to write their names. This does not mean that such people are inherently unable to think through and size up and carry out new production activities, but with their limited experience and training they are slow to grasp new ideas and lack the initiative and enterprise that characterize more progressive farmers.[11] Among these people in particular, programs of technical and supervisory assistance will need to be closely integrated with programs of financial assistance if

[10] This has led some observers to make rather severe criticism of FHA lending policies. In the Piedmont of Georgia, for example, the funds available under present FHA credit policies are inadequate for purchase of a farm and the establishment of a dairy enterprise for producing milk for fluid consumption uses. Yet in a few counties, several FHA borrowers have made a conversion to dairy farming. While FHA funds have been inadequate, many of these farmers have been able to supplement the FHA loan with their own savings, often in kind, or with credit obtained from other sources. Thus, while FHA credit by itself has been inadequate, the funds that were available have nevertheless been indispensable to the adjustments made, adjustments that in most cases are on an economically sound basis. With larger loan limits, FHA would unquestionably be able to help many farmers who now lack enough resources to supplement the FHA loans to make such adjustments. There is need for all credit agencies to emphasize loans large enough to establish adequate farming units in contrast to loans only large enough to salvage and perpetuate present inadequate systems. In this regard, the record of FHA is probably as good if not better than that of other credit agencies in low-income areas.

[11] Among all FHA ownership units in four Georgia Piedmont counties, selected for intensive study because of the large percentage making changes from cotton to other systems of farming, we note that more than half of those operators who have continued a strictly cotton type of farming have less than fourth grade schooling. Among those who have changed from cotton to cotton-dairy systems none has lower than eighth grade schooling.

progress is to be made. Such programs are costly and failures occur. But once technical skills and entrepreneurial abilities are developed, they help to generate further progress, also become a part of the community's production resources passed to succeeding generations, and must be so evaluated. Present programs of technical and supervisory assistance to farmers are operating on what may seem a fairly large scale. But viewed against complexity of the problem and the needs for making major technological changes such as conversion from cotton to combination cotton-livestock farming systems, present programs of technical and supervisory assistance in low-income farming areas appear fully as inadequate as existing programs of financial assistance.

Adoption of new technologies made economically feasible by recent discoveries and inventions and by changes in market relationships afford large opportunities of increasing efficiency in agriculture. Available evidence indicates, however, that small scale farms and to a lesser extent, small family farms, are being by-passed in the process of mechanization and other technological developments that contribute so much to increased agricultural productivity.[12]

In large part, this fact can be accounted for by the large resource gaps, including physical capital and entrepreneurial abilities, that must be bridged to employ effectively the new technologies. Left to their own limited resources and their present low levels of incomes, it is practically impossible for many of the nation's low-income farmers to bridge these wide resource gaps, no matter how economically desirable the new technologies are. Usual credit policies of both commercial and cooperative credit agencies appear adequate for the maintenance of the present inadequate farming systems. They are largely inadequate, however, to enable these farmers to participate in the technological progress and increased productivity that is possible and that is now badly needed both for their own welfare and for the nation's defense.

To aid effectively low-productivity farmers to make major technological changes, closely integrated programs of both financial and educational, or technical and supervisory assistance will probably be needed. Such a program is available through the Farmers Home Administration. This program, however, is operative on a very small scale. To make much dent upon the problem of low-productivity, many farmers need far more resources than the FHA is now able to provide. And with all that FHA can do, there is still need to find ways in which commercial and cooperative credit agencies can contribute more to bringing low-productivity farmers into fuller participation in the technological and economic progress that characterizes our nation's economy.

[12] K. L. Bachman and R. W. Jones, *Size of Farms in the United States*, Technical Bulletin No. 1019, U. S. Department of Agriculture, July 1950. See also testimony by D. Gale Johnson, *Hearings before the Subcommittee on Low Income Families* of the Joint Committee on the Economic Report, U. S. Congress, December 16, 1949.

FUNCTIONING OF THE LABOR MARKET*

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DURING the last three decades there has been a continuous interchange of workers between agriculture and the rest of the economy. This interchange has resulted on balance over the three decades in a net movement of members of the farm labor force into the nonfarm labor force.[1] In this paper I have tried to analyze the functioning of the labor market, particularly the nonfarm labor market, as it has affected the net transfer of labor from agricultural to nonagricultural pursuits. The analysis is in a normative context—there is an interest in determining how well or efficiently the market has functioned. It is assumed that the market should function to provide for an efficient utilization of the nation's labor resources. For present purposes the following (incomplete) criterion of efficiency has been accepted: Labor of equivalent capacities should earn the same real (marginal) return in all employments.[2]

Our inquiry emphasizes two main issues: (1) What is the relationship between real returns to labor in agricultural and nonagricultural employments for comparable labor? (2) Does the functioning of the nonfarm labor

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[1] The net movement of farm population to nonfarm areas from 1920 through 1949 was approximately 17.5 million, of which perhaps half was in the labor force. The total outmovement from farms during these three decades exceeded 50 million. Size of movements based on BAE estimates of farm population and migration.

[2] This proposition is a useful criterion of efficiency if one of three conditions actually exists. First, there is nowhere in the economy a significant difference between the price of labor and the value of its marginal product. This condition would prevail, more or less exactly, if there were no monopoly or monopsony. Second, if monopoly or monopsony exists, it results in a difference between the price of labor and the value of its marginal product where the price of a given quality of labor is high relative to the price of the same quality of labor employed subject to competitive conditions. A transfer of labor from low paying jobs to higher paying jobs would increase total real output. The efficient position as defined by our condition would not, of course, represent an absolute maximum. Third, the incidence of monopoly or monopsony is randomly distributed as it affects jobs with different levels of (real) pay for labor of comparable capacities. Some transfers from lower to higher paying situations would result in a decline in the value of marginal product of some labor, but on balance a net increase would occur.

It would appear that our criterion would fail to indicate change in the right direction only if the value of the marginal product of labor exceeds its wage in those cases that the individual worker would gain by transferring to a higher paying job, in which the value of the marginal product did not exceed the wage. Even here, if the wage in the latter exceeded the value of the marginal product in the former, an improvement could result.

It should be apparent that our criterion for judging the functioning of the labor market forces us to consider only one part of a total situation—namely, do all (most) laborers—within a given structure of demand by firms—achieve the best use of their own labor resource?

market adversely affect farm migrants in their search for jobs? These, of course, are not all of the issues that could be considered.

I. *Real Returns to Farm and Nonfarm Labor*

The use of our restricted criteria—equal real returns to equivalent labor—requires three different types of determinations. Each is a major undertaking in itself; consequently, in this paper some will have to be considered only cursorily. First, it is necessary to determine the differences in the purchasing power of income as it may be affected by region, occupation, and community size. Second, it is necessary to determine the equivalence of capacities or skills of the groups being compared. Finally, it is necessary to determine the money value of the labor return. The latter is an extremely complicated undertaking in agriculture and none too simple in many nonagricultural cases. In agriculture, roughly three fourths of all labor is performed by the farm operator or his family. For these workers there is no explicit money wage to be used as a guide, but the returns must be calculated by techniques of somewhat dubious validity. Even these techniques, which might give reasonable results under ideal conditions, are made even less reliable because we do not have satisfactory measurement of the labor employment in agriculture and of the nonfarm labor incomes of individuals whose major work activity is in agriculture. (These two problems are related, of course.)

Some research has been done on the measurement of the purchasing power of income in farm and nonfarm areas.[3] In this paper I shall assume that a dollar earned in a farm area will purchase 25 percent more than a dollar earned in a nonfarm urban community. The difference would be less than this if the comparison is with a rural nonfarm community.

A study of the comparability of the farm and nonfarm residents as workers[4] that analyzed data on the work experience of migrants indicated two conclusions: (1) Recent migrants from farm areas obtained jobs that paid roughly 90 percent as much as the median received by the nonfarm popula-

[3] See the article by Nathan Koffsky and the comments by Margaret G. Reid, E. W. Grove, and D. Gale Johnson in *Studies in Income and Wealth*, Vol. XI (New York, National Bureau of Economic Research, 1949). Koffsky estimates that for low income families, the cost of a farm budget at urban prices (1941 data largely) would have been 30 percent greater than at farm prices. This is, of course, an overestimate of the cost of achieving an equivalent level of consumption as measured by satisfaction. It is also likely that in the higher income brackets the purchasing power of income on farms falls relatively to urban purchasing power. Food expenditure is a smaller proportion of total expenditure, and home produced food declines as a proportion of total food. It is the food category that is responsible for most of the difference in purchasing power of income. In recent years, the difference in purchasing power would be narrowed by the increase in the ratio of food valued at farm prices and food valued at urban retail prices.

[4] "Comparability of Labor Capacities of Farm and Non-Farm Labor," (dittoed). The measure of capacity was the income earning ability of farm migrants in nonfarm occupations compared to the actual income earned by the nonfarm population as wage and salary workers. The study is subject to numerous reservations which are indicated in the paper.

tion after adjustments had been made for age and sex, and (2) there was no important difference to be attributed to the region of origin in the occupational experience of migrants, if only whites are included. I do not take the 90 percent figure very seriously. Its meaning to me is that there is probably not much difference between the capacities and skills of farm and nonfarm people, taken as a group. Some of the difference, assuming it to be statistically significant, is related to the relatively short period of adjustment permitted the farm migrants. The remainder might well be attributed to differences in education.

The return to labor in agriculture has been estimated in my article, "Allocation of Agricultural Income."[5] Several of the reservations implicit in the methods are discussed in that paper and need not be repeated here.

Whether these estimates are a fairly reliable indicator of the total annual labor return of individuals employed in agriculture depends largely upon the estimate of labor employment used. If the estimate used is a good measure of the man years of work done in agriculture, there is no need to add in any returns from nonfarm work. If the estimate used is a good estimate of the number of individuals whose major activity was in agriculture, there is probably little need for adjustment.

The current estimates of farm employment published by the BAE are undoubtedly too high to serve as an estimate of either full-time employment or of the number of individuals with their major work activity in agriculture. The estimates contained in the MRLF are probably somewhat low.[6] It is possible to obtain an independent estimate of farm employment by patching together bits and pieces, starting from the estimates of total farm population. If this is done, one gets an estimate of about 10 million individuals 14 years and over employed in agriculture in 1940 and about 8.5 million in 1948. To these should be added perhaps 500,000 children under 14. The official BAE estimates are 11.671 million and 11.08 million for 1940 and 1948 respectively.

If we use the lower estimates and ignore children under 14 years, we get an average labor return of $410 in 1940 and $1,770 in 1948, the peak year of labor income during the forties. The income of employed industrial workers was $1,275 in 1940 and $2,710 in 1948.[7] The farm labor returns after the adjustment for cost of living differences are $560 and $2,210.

But these estimates cover up the very wide diversity of agricultural labor returns associated with location. Table I gives estimates of the average labor returns per worker from farming by regions for 1940 and 1945.[8]

[5] *This Journal*, Vol. XXX (November, 1948) pp. 724–49.

[6] See "A Critical Appraisal of Farm Employment Estimates" by M. C. Nottenberg and this writer, to be published in the *Journal of the American Statistical Association.*

[7] *Agricultural Outlook Charts*, 1950, p. 3.

[8] Available evidence indicates that the relative income positions of the three southern regions were no better in 1929 than in 1940 or 1945. See BAE, USDA, *Income Parity for Agriculture*, Part VI, Section I (October, 1943).

Net income data are not available by states or regions since 1945, but on the basis of total cash receipts the South Atlantic lost ground relative to the nation exclusive of the South; the East South Central retained its relative position and the West South Central gained slightly between 1945 and 1948. Consequently, it seems reasonable to assume that 1948 data would reveal much the same relative picture.

If the data in Table I are modified to include only labor performed by whites, the figures for labor returns in the South would be increased by 10 to 15 percent. This leaves them considerably below any non-south region.

TABLE I. AVERAGE LABOR RETURNS PER WORKER YEAR FROM FARMING BY REGIONS 1940 AND 1945[a]
(in dollars)

	1940	1945
New England	510	1,090
Middle Atlantic	565	1,100
East North Central	505	1,455
West North Central	500	1,745
South Atlantic	260	710
East South Central	260	540
West South Central	315	760
Mountain	505	1,560
Pacific	530	2,200
U. S.	385	1,135

[a] Estimates made by writer from BAE and Census data. Labor return is a residual after deducting from net farm income the estimated rent on land plus a return on non-land capital. Farm employment in 1940 was assumed to be 10.5 million and in 1945 about 9.8 million. These were roughly the BAE estimates available at the time the study was made; they are about 10 percent less than current BAE estimates and about 10 percent higher than estimates made by the Bureau of the Census for workers 14 years and over.

The data in Table I would seem to reflect a rough equivalence between farm and nonfarm labor returns in three and perhaps four regions in 1945. The average wage income of employed industrial workers was $2,255.[9]

II. *Functioning of the Nonfarm Labor Market*

Migration and the increase in the number of nonfarm jobs held by farm people have not been important enough to achieve equality of real returns

[9] In any comparison of farm and nonfarm wage incomes, it must be remarked that the age and sex distribution of the farm and the nonfarm working force differs. Considering only the workers over 14 and using urban wages as weights, the 1940 farm population had an earning capacity about four percent below the nonfarm.

The regional pattern of nonfarm wages and incomes is considered in Section II. Average wage income of industrial workers is estimated by dividing annual earnings of factory, railroad, and mining workers by average employment. See BAE *Agricultural Outlook Charts*, 1950, p. 3. This particular group of workers has an average annual wage income of about 90 percent of the U. S. nonfarm average in most recent years. In 1945, however, the average for the group was about the same as the U. S. nonfarm average.

In 1940, in contrast, the highest average regional labor income was only $565, or about 55 percent as much as the income of employed industrial workers *after* adjustment for cost of living differences. Only in the East South Central States was there no indication of relative improvement in the ratio of farm to nonfarm labor incomes between 1940 and 1945.

between farm and nonfarm occupations requiring equivalent capacities for three regions with about half the farm population. When there is a high proportion of unemployment in the nonfarm sector of the economy, the failure of migration is inexplicable. But we have now had a decade of high level employment and the relative position of low income farm regions has not been improved appreciably.

A. *Regional Nonfarm Wage Rates*

It is possible that farm people in low income farm areas may not find alternative jobs outside of agriculture because either the nonfarm jobs in the immediate localities are relatively low paying jobs, or controls prevail that limit the access of farm workers to nonfarm jobs. These seem to be the two most important influences that might operate from the demand side.

The importance of nonfarm wage levels in the low farm income areas follows from a significant feature of domestic migration—the preponderance of short distant moves. Analysis of the data on farm migrants from the South, the largest area of relatively low farm labor incomes, who moved to nonfarm residences indicate that for the period 1935–40, 84 percent of the white males and 94 percent of the nonwhite males stayed in the South. Considering all farm migrants (from all regions) to urban areas, 60 percent remained in the same state and 20 percent moved to contiguous states. A slightly larger percentage of the farm migrants to rural nonfarm communities moved shorter distances—64 percent within a state and 18 percent to contiguous states.[10]

If there were the same general disparity in labor returns in the nonagricultural sectors of the economy by areas as there is in agriculture, the failure of migration (job mobility) to solve the problem of low incomes in agriculture would be understandable. But does such a similar pattern of nonfarm labor returns exist?

It is true that per capita incomes in the South are considerably lower than the national average—60 percent as much in 1935 and 70 percent as much in 1946. But the lower per capita income payments seem to be explained almost completely by the following considerations: (1) The greater relative importance of agriculture in the South than in the rest of the country; (2) The relatively lower incomes in agriculture than in the rest of the country; (3) The greater relative importance of nonwhites in the South; and (4) The different distribution of the nonfarm population among communities of various sizes. If these factors are isolated and their effects determined or eliminated, it appears that white families in communities of the same size have roughly the same incomes in the South as in any other

[10] *U. S. Census, Population, Internal Migration, 1935 to 1940, Economic Characteristics of Migrants*, Tables 10 and 3.

region of the nation. This is not true of nonwhites, however, since the incomes of nonwhite families are significantly lower in the South. Tables II and III present some of the relevant data; other data indicating the same conclusions are available.[11]

TABLE II. MEDIAN WAGE OR SALARY INCOMES OF URBAN RESIDENTS WHO EARNED $1 OR MORE AND HAD NO OTHER MONEY INCOME BY REGION, SEX, AND COLOR, 1939

Area and Color	All Workers[a]		Worked 12 Months[b]	
	Male	Female	Male	Female
White Workers				
Northeast	$1,237	$728	$1,485	$920
North Central	1,282	717	1,510	883
South	1,122	686	1,359	826
West	1,334	827	1,611	1,040
U. S.	1,247	725	1,488	907
Nonwhite Workers				
Northeast	835	476	1,020	568
North Central	804	406	981	526
South	500	242	631	296
West	768	496	952	639
U. S.	602	297	739	366

[a] 16th Census of the United States, 1940, *Population, The Labor Force, Wage or Salary Income in 1939*, Table 5. Excludes individuals on public emergency work.
[b] *Ibid.*, Table 5a.

TABLE III. MEDIAN INCOMES OF WHITE AND NONWHITE URBAN FAMILIES BY REGIONS, 1946[a]

Region	Median incomes	
	White	Nonwhite
Northeastern States	$3,367	$2,235
North Central States	3,244	2,294
West	3,206	[b]
South	3,014	1,549
United States	3,246	1,929

[a] Source: Bureau of the Census, *Current Population Reports, Consumer Income*, Series P-60, No. 1, Rev., Table 4.
[b] Data not given in source. Median for urban and rural-nonfarm nonwhite families was $2,659. Median for urban families probably about $2,750 to $2,800.

It should be remembered that the urban classification does not result in a homogeneous distribution of community sizes among regions. Consequently, it is to be expected that if the regions could be further subdivided into groups according to community size, the southern white incomes would roughly approximate those in the rest of the country.[12]

[11] See D. Gale Johnson, "Some Effects of Region, Community Size, Color, and Occupation on Family and Individual Income." Mimeo. to be published by the National Bureau of Economic Research.
[12] See Herbert E. Klarman, "A Statistical Study of Income Differences among Communities," in *Studies in Income and Wealth*, Vol. VI.

Thus far we have been dealing with large areas. It is possible that in any given and predominantly rural areas with low farm incomes, nonfarm incomes could be low and be offset by higher nonfarm incomes in the same region, thus raising the regional average to roughly the national level. This could occur if the sub-areas within the region with low farm incomes have only a small proportion of the nonfarm population of the region.

A tentative test of this possibility has been undertaken, but the results are essentially negative. There does not seem to be any relation, either in the South or in the North Central States between the level of nonfarm income and farm income if counties are used as the basis of comparison.[13]

The wage structure in nonfarm employment may not be a good index of the wages in the jobs available to farm migrants. Employment in some jobs may be closed to a considerable degree by monopoly—either by firms or unions; in other cases, legal minimum wages may reduce the level of employment in affected industries. The wage structure of the jobs that farm migrants could obtain might reflect wages considerably below that paid for nonfarm workers with similar capacities, which would reduce the amount of migration out of agriculture.

B. *Effects of Unions on Wage Rates*

In 1945, total union membership in the United States was roughly 14 million or about one third of the nonfarm labor force. The fact of organization is not adequate evidence that unions have significant control over job opportunities, either by affecting wage rates or by control of the specific individuals working in the organized firms.[14] Wage rates—and thus the total of job opportunities—can be controlled, in theory at least, in two ways. First, by bargaining, backed by the threat of various punitive measures, that establishes a wage rate above what the firm would have to pay

[13] The test was designed as follows:

A sample of 20 percent of the counties, excluding metropolitan counties, in eight Midwestern States and of 50 percent of the counties in five Southern States were drawn. These counties were ranked by the level of (gross) farm income per farm in 1940 within each state and then grouped into quartiles or thirds. For each of these groups of counties, the average annual wages per worker in retailing and in manufacturing were calculated. Even though the average farm income in the top group of counties was three or four times the bottom group, there was no discernible difference in the level of earnings in retailing and manufacturing (See Table IV).

Gross farm income is not as satisfactory a measure of farm income as one would like. It is believed that the exclusion of the metropolitan counties will exclude most of the part time farms in each of the states. (For about half of the states the counties also were grouped by gross income per farm worker. This change in classification did not affect the results.) Differences in gross farm income could possibly reflect differences in types of farming as it affects the relation between gross and net income, but casual inspection of the counties and their area distribution do not leave this impression. In any case, the difference between the gross incomes in the highest and lowest groups in each state is so large that it certainly reflects substantial differences in net farm income—at least of the order of two to one.

[14] Wage rates are not, of course, the only determinant of total job opportunities that might be brought under the control of unions. "Work standards" can be and perhaps are in some cases very important.

to attract the number of workers that it is willing to employ at that rate. Second, by direct control over the number of individuals permitted to be union members—through initiation fees, apprentice rules, and period of required training—and forcing employers to hire only union members.[15] If there is competition among employers, this will force wage rates to higher levels (if numbers have actually been controlled); if employers organize, the results are probably indeterminate, since the employers fear that higher wage rates will not attract more workers.

TABLE IV. AVERAGE LEVEL OF ANNUAL WAGES IN RETAILING AND MANUFACTURING IN COUNTIES RANKED BY LEVEL OF GROSS FARM INCOME IN 1939

A. North Central States

(in dollars)

	Iowa		Illinois		Nebraska		Kansas	
	R[b]	M[b]	R	M	R	M	R	M
Group I[a]	714	810	712	871	752	773	724	1,046
Group II	699	970	796	976	700	921	646	913
Group III	728	926	792	1,043	627	797	668	949
Group IV	675	816	714	836	651	742	702	961

	Minnesota		Wisconsin		Indiana		Ohio	
	R	M	R	M	R	M	R	M
Group I	749	867	807	991	798	897	834	1,061
Group II	837	1,133	959	970	734	860	741	944
Group III	789	976	697	822	719	752	758	914
Group IV	826	811			696	776	706	952

B. Southern States

	Georgia					
Percent nonwhite	0–30		30–50		50 or more	
	R	M	R	M	R	M
Group I	550	462	610	496	537	489
Group II	563	440	539	472	584	445
Group III	647	—	618	536	499	451
Group IV	516	509	489	504	596	411

	Kentucky			
Percent nonwhite	0–5		5 or more	
	R	M	R	M
Group I	633	705	789	733
Group II	629	678	723	596
Group III	557	829	624	603
Group IV	617	555	641	668

[15] This technique may only be supplementary to the first and used by the unions as a rationing device to allocate the available number of jobs among its members. Some of my friends, who know much more about unions than I do, believe this to be the case.

TABLE IV—*continued*

Percent nonwhite	Tennessee			
	0–10		10 or more	
	R	M	R	M
Group I	585	684	558	682
Group II	595	643	601	570
Group III	535	613	542	535
Group IV	551	484		

Percent nonwhite	Virginia					
	0–10		10–40		40 or more	
	R	M	R	M	R	M
Group I	675	697	724	688	710	482
Group II	738	754	633	512	703	519
Group III	734	—	613	—	611	449
Group IV	819	686			625	381

Percent nonwhite	North Carolina					
	0–10		10–40		40 or more	
	R	M	R	M	R	M
Group I	723	740	650	498	665	613
Group II	586	516	649	573	679	465
Group III	622	654	733	672	680	559
Group IV	658	650	631	600	553	498

Source of data: U. S. Bureau of Census, *County Data Book, 1940.*

[a] Counties ranked by level of gross farm income per farm and then divided into roughly equal groups. Group I includes highest income counties and Group IV (or III) the lowest.

[b] R=retailing; M=manufacturing.

TABLE V. RELATION BETWEEN CHANGES IN AVERAGE STRAIGHT-TIME HOURLY EARNINGS AND CHANGES IN DEGREE OF ORGANIZATION, 1933 TO 1946

	Degree of Organization[a]				
	I	II	III	IV	V
Number of industries	4	10	9	21	6
Absolute increase (cents)[b]	54.0	56.2	61.6	64.3	50.4
Percentage increase[b]	183	142	144	136	95
Change in employment[c]	71	86	182	174	38

Source: Taken directly from or calculated from data in Ross and Goldner, *op. cit.*, pp. 258–59, 270–71, 274–75.

[a] Degree of organization: Groups I to IV, less than 40 percent organized in 1933; Group V more than 40 percent organized in 1933. Group I, less than 40 percent organized in 1946; Group II, 40–60 percent; Group III, 60–80 percent, and Group IV, 80–100 percent.

[b] Unweighted average.

[c] Percentage increase for the Groups. Coverage not quite identical with data on wage increases.

The use of either technique by unions may result in the creation of a "counter force." Employers resist wage rate changes that might well be in their own interest in the absence of unions. Employers also may be more prone to organize and follow a set pattern of action.

The effects of unions on wage rates is subject to dispute; research in this field consists of bits and pieces rather than systematically integrated theoretical and empirical work. The approach that has been most popular is to compare changes in wage rates in unionized industries from a time prior to unionization to some second date with the changes in wage rates in a non-unionized industry. If this could be done for a large number of pairs of industries in which each member of the pair were comparable in all other important respects, some useful insights might be achieved. But such comparisons are usually not possible, either because of lack of data or because the similar industries seem to fall into either the unionized or non-unionized categories. Studies have also been made of firms in the same industries that are unionized and not unionized, but failure to eliminate such factors as size of plant or location by region or city size make it difficult to interpret the results.

A pioneer study of the effect of unionism on wages is contained in Professor Douglas' famous *Real Wages in the United States, 1890 to 1926.* Douglas compared indexes of hourly earnings in "union" manufacturing industries and in "payroll" manufacturing industries.[16] Using 1890 as a base of 100, the union industries' full time weekly earnings increased to 261 in 1926, the payroll industries to 275. If 1914 is used as a base, the increase was to 216 for union industries and to 205 for the payroll industries.[17] During the same period, unskilled labor increased from 100 in 1890 to 293 in 1926, and from 100 in 1914 to 209 in 1926.[18] Douglas concludes as follows: "It seems clear, in any case, that the increase in real wages during the period studied has been caused primarily by the increase in productivity rather than by unionization."[19]

Douglas' results have been criticized by Ross because Douglas relied upon relative changes in wage rates rather than absolute changes. The basis for his criticism seemed to be the following: The non-unionized industries had lower earnings in the base period and if both groups of industries received equal absolute changes in wage rates, the non-unionized industries

[16] The latter group included some industries that were partially organized during part of the period. However, the significance of unionism in this group seems to have been fairly unimportant.

[17] Paul H. Douglas, *Real Wages in the United States, 1890–1926*, pp. 119 and 126. The weekly earnings were $17.83 in 1890, $21.379 in 1914 and $46.22 for the union industries (p. 118), $9.27, $12.42 and 25.47 respectively for the payroll industries (p. 124).

[18] *Ibid.*, p. 177. It should be noted that the building trades, unionized after 1890, showed greater relative increases in earnings than any of the groups cited in the text. With 1890 equal to 100, 1914 weekly earnings were 146 and 1926 earnings were 331. However, 1926 was a boom year for building and this may have had some effects on the results.

[19] *Ibid.*, p. 564.

would show the larger percentage increases. If equal absolute changes in earnings are indicative of equal improvement, the percentage changes in earnings would give a fallacious indication.

The choice of the measure to be used in indicating the effects of unions upon wage rates cannot be made in so arbitrary a fashion. The choice rests on presumptions about how the wage rate pattern would have changed during the period in the absence of unions. Ross' analysis must rest on the assumption that without unions absolute changes in wage rates would be equal, with the relative or percentage differentials narrowing. Most classical analyses of the labor market assume that without unions percentage differentials would remain constant, with the absolute differentials widening. *A priori* it is impossible to say what changes would have occurred in the absence of unions. It is necessary to develop a general equilibrium model of the labor market, and from whatever information is available about the parameters of the model, estimate the changes that would have occurred in the wage rate pattern. Equal absolute or equal percentage changes are only two of a number of possibilities.

Even accepting Ross' criterion of absolute increases as a measure of the effectiveness of unions, there is no evidence in the material he presents that indicates that the degree of organization in 1946 was a factor influencing the change in wage rates. The material presented includes the absolute changes in hourly earnings for industries classified by degree of unionization. The relatively unorganized group received increases averaging 54.0 cents per hour; the most highly organized industries had an average increase of 64.3 cents per hour.[20] But analysis of variance indicates that the group means do not differ significantly.[21]

If instead of absolute increases, relative increases are used, it is found that the differences in relative increases by degree of unionization from 1933 to 1946 are very small. The most unionized groups have the smallest increases, but the differences are probably not significant. The period from 1933 through 1946 should provide a fairly good test, since most unionization in the United States occurred following 1933.[22]

Joseph Garbarino found that the degree of unionization was not significant in explaining (relative) wage changes between 1923 and 1940. Most of the changes seemed to be explained by changes in output per man-hour, degree of enterprise concentration and employment.[23]

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[20] Arthur M. Ross and William Goldner, "Forces Affecting the Interindustry Wage Structure," *Quarterly Journal of Economics*, LXIV (May, 1950), pp. 270–71.

[21] The value of F is 2.14. The value of F for the 5 percent level of significance is 2.85. Of course, the test of significance used may not be a reliable one.

[22] If data were available, 1929 should be substituted for 1933 so that the years compared would both be ones of essentially full employment. Likewise, a year later than 1946 should be used to avoid the effects of war-time wage policy.

[23] Joseph W. Garbarino, "A Theory of Interindustry Wage Structure," *Quarterly Journal of Economics*, LXIV (May, 1950), pp. 282–305, esp. 302 and 305.

Lester has compared the wage rates for union and non-union plants based on data from a group of wage studies made by the BLS for 1943, 1944, 1945, and 1946. The comparisons were for a city or local labor market or a region. In general the wage rates in non-union plants were as high as or higher than in union plants in about 30 to 35 percent of the cases.[24] But many of the non-union plants were much smaller than the union plants and smaller plants generally pay somewhat lower wages than large plants. Consequently it would be necessary to standardize for the size of plants before an accurate comparison could be made. In any case, these data do not indicate that unions have achieved appreciably higher wage rates than those paid to non-union workers.

The above data are not conclusive evidence that unions do not, in general, have much effect on wage rates. Nor do they preclude the possibility that unions involving upwards of three million or so workers, particularly the building trades, railroads, and printing, have not had appreciable effects on wages. But the contrary hypothesis that unions have in most cases "distorted" the wage structure in a way inimical to farm migration does not seem to be supported by available data.

If unions have not had much effect on wage rates, obviously the employment opportunities available to new entrants into the nonfarm labor force have not been restricted by high wage rates in the unionized industries. This does not prove that unions cannot affect employment opportunities in other ways. Two such avenues seem to be open to them: raising labor costs by reducing output per unit of time and by affecting lay-off and hiring policy. A few comments on the latter policy are in order. As long as we have recurring periods of unemployment, union rules affecting seniority on lay-offs and re-hiring may work to the disadvantage of recent farm migrants. Such migrants will be among the first to be laid off (if they have had a job) and the last to be re-hired or hired. During a recovery period, new entrants to the non-farm labor force will be forced to wait until all workers who have been laid off (and wish to return to work at their old jobs) are taken on before the migrants can be employed. However, if we are able to maintain employment at high levels almost all of the time, the seniority rules imposed by unions should not have much impact upon the availability of job opportunities.

Job opportunities available to farm people may be influenced by governmental action, particularly by minimum wage legislation. It is unlikely that minimum wage legislation in the United States has had much effect. Rising price levels have tended to negate any influence that such legislation might have had. But minimum wage legislation that exempts certain industries

[24] See Richard A. Lester, "Some Reflections on the 'Labor Monopoly' Issue," in Francis S. Doody, *Readings in Labor Economics*, pp. 304–06.

(agriculture) and fails to recognize community size and occupational differences could reduce the alternatives open to many farm migrants, particularly nonwhites and those whites who could obtain only relatively low paying nonfarm jobs.[25]

III. *Why Has Migration Failed?*

If our two main propositions concerning regional or area wage rate differences and the effect of unions on wage rates are valid, the failure of migration has not been explained by our analysis. Two possibilities remain. One, there may be other aspects of the functioning of the nonfarm labor market that pose barriers to migration. We have mentioned one earlier, namely, the uncertainty of unemployment due to business fluctuations. If other aspects are important, I have been unable to determine what they may be. Second, the main barriers to migration may be indigenous to the farm people and the conditions in which they live.

At present, I would argue that understanding the failure of migration to achieve equality of returns to labor in agriculture and non-agriculture will come largely through analysis of influences indigenous to farm people and their immediate environment. Most farm people in low income areas may be ignorant of the economic opportunities existing elsewhere; most may have insufficient capital to permit a move; most may have so limited a set of experiences that they fear the transition to nonfarm life; many may feel strong family or community ties; many may have reached an age that inhibits seeking new experiences; others may reject the values and modes of living that they associate with nonfarm living. These are some of the possible explanations, but as yet no one has designed a detailed and acceptable research program that would provide us with new insight. The development of such a research program is one of the important challenges in the study of rural life.

DISCUSSION

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My discussion of these three thought-provoking papers is essentially from the point of view of the farm manager.

With respect to Dr. Wilcox's realistic paper, I'd like to raise four points:

1. The paper holds that the price mechanism is not an effective director of resource allocation—particularly of capital and labor—either within agriculture or between agriculture and industry. As a farm manager I see tremendous long-time changes which were at least partly associated with price changes. These long-time changes include shifts in cropping and livestock programs, mechanization, some shift in population from farm to nonfarm work, etc. The incentive was often that of

[25] The application of the U. S. Minimum Wage law to Puerto Rico apparently had very serious employment effects and would have had even more had it not been for large scale evasion. It was found necessary to adopt special minima for the island.

personal financial gain. Not infrequently farmers have been forced to adopt new technologies in order to lower production costs. Rising prices of inputs or falling product prices (sometimes due to increasing supplies forthcoming from these who had already adopted cost-reducing techniques) made increases in efficiency essential for profitable operation. Therefore, I conclude, since long-time increases in efficiency have been substantial and since price has been the principal regulator or guide, that price changes are not totally ineffective as motivators of increased efficiency. The shorter the time period involved, the less effectively price changes serve this function. Dr. Wilcox's analysis, I assume, is directed primarily to short-time adjustments.

2. Dr. Wilcox has accurately pointed out that few farmers are in a true equilibrium situation at any given time. I would go further to say that few of them ever will operate their businesses at absolute optimum levels, even if they have adequate capital, are well informed, and are fully rational. Why? Because the individual farm business is a complex of interrelated departments or branches. Very few farm managers have the capacity simultaneously to operate all departments of the business at optimum. Certain crop production enterprises may approach equilibrium while crop utilization departments (as individual classes of livestock) are far short of most economic proportioning of factors. Apparently business management techniques in agriculture have not yet been developed or put into use which enable entrepreneurs to approach optimum resource combinations in all departments at all times. As Dr. Wilcox states, rapidly changing production processes may make this virtually impossible. Some farmers approach the optimum in a higher proportion of their enterprises than others. They are the few—the high-income operators.

3. One further inference which might come from reading Dr. Wilcox's paper is this: resource allocation within agriculture is so poor that potential increases in agricultural production are tremendous. This is true for all farms as a group over the long pull. But our principal productive capacity, as pointed out, is in our medium or larger size farms. Under the impetus of rising prices following the decade of the 1930's, these farms did vastly increase their production. Perhaps 10 to 15 years' "normal" technological progress was telescoped into five or six years. As a result, these farms are much more nearly at optimum today than 10 or 15 years ago. Many innovations remain to be adopted, yes. But the slack is of smaller proportions than before World War II. Therefore, despite rising product prices and continued technological developments, production increases in the five years ahead probably will not match those of the period of most rapid increase during World War II. We are starting from a relatively higher level than 10 years ago and these farmers are so well financed that some are actually searching for places to invest additional capital.

4. With respect to the use of economic models for agriculture, Dr. Wilcox's criticisms seem valid to me. Those who are using these models, however, are aware of the many shortcomings of their approach. I for one am anxious to see their work go forward. The proof of the pudding is in the eating. To me, the next 25 years is going to be very much worth living, foretasting the pudding now being receipted.

In commenting briefly upon Dr. Hendrix's carefully developed paper, it must be recognized that I am biased by my corn belt experience. In addition, it is only fair to state that the bulk of our corn belt low-income farm problems remain to be solved. However, at the risk of oversimplifying the problem, let us analyze a few of Dr. Hendrix's observations.

He holds that more available capital—and he really means more, not just small increments—would greatly accelerate the rate of economic progress in low-income areas. Existing credit institutions, he feels, are backward-looking and "identify

performance as potentiality." As evidence that this credit policy may be in error, he points to farms where change to a new farming system doubled the justifiable earnings value. The operators who changed to the new farming systems, however, were probably superior entrepreneurs. Therefore the question, does the increase in value attach to the land resource or the entrepreneur (management) input?

Based upon limited observation in the area under discussion, it appears that management and properly trained labor may be relatively more scarce than capital. As Dr. Hendrix points out, measurement of the management function is extremely difficult. But were it subject to ready measurement, we might discover that "management rationing" is a more acute problem than capital rationing.

At the risk of appearing naive, I'd like to suggest this thought. As non-agricultural industries move into new areas, they often import specialized management and capital. Local labor is trained for new work and possibly made productive out of proportion to its previous capacity.

Is there not a parallel here for an area's agriculture which faces production innovations of near-revolutionary, high capital-consuming proportions? Break down the problem into the functions of: (1) risk bearing (provision of capital), (2) management, and (3) labor. Capitalize on existing labor and management, import some management if necessary, and tap private capital markets for funds. In other words, try to attract private risk capital to the area from absentee landlords. The incentive would be capital gains and/or higher-than-usual returns to capital. The price, of course, is uncertainty. Existing skilled management would be spread over a larger area. There are possibilities of both tenant and direct farm operation (farming with hired labor) under the supervision of hired management.

Such an introduction of specialized management along with capital should materially increase the worker's marginal productivity. The number of farms reached directly would admittedly be small. But new practices, techniques, and production innovations are accepted more readily by direct observation than by radio or bulletin suggestion. Some of our professionally managed corn belt farms have become centers for innovation, dissemination of the new, and for the training of some of our most accomplished farm operators.

The foregoing is not meant as a criticism of Professor Hendrix's suggested research program. But it does suggest this supplement. If several of these near-model new system farms exist, study them carefully. Learn the details of their organization. Then if the earning possibilities of changed types of farming and use of production innovations are as great as it now appears, attempt to attract private absentee capital in combination with professional management. This latter action should, of course, merely supplement other educational and promotional programs.

At least one northern professional farm management firm has launched such a program. Its progress to date has been sufficiently successful to merit close study.

ECONOMIC CONSIDERATIONS IN FRYER PRODUCTION AND MARKETING IN THE PACIFIC NORTHWEST*

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THE severe competition from Midwest poultry meat producers is one of the more important of the many problems faced by the poultry meat producer in the Pacific Northwest. This condition is a direct result of the present unfavorable poultry meat-feed ratio in the Pacific Northwest as compared with the relatively favorable meat-feed ratio in the Midwest.

The present government price support program causes locally grown wheat, the important carbohydrate ingredient of poultry rations in this region, to be high-priced relative to the corn grown and used in the Midwest. Poultry producers in this region are dependent upon this locally grown wheat for their feed, or upon feed shipped in from competing poultry meat producing states of the Midwest. Under these conditions, the immediate outlook for this region's poultry meat industry is not particularly propitious. If the poultry meat industry in this region is to continue on a sound basis, we must answer affirmatively the following question: "Under relatively unfavorable poultry meat-feed conditions, is it possible for the poultry meat (fryer) producers in the Pacific Northwest to compete favorably with the Midwest in local markets?"

Our thesis is that the poultry meat (fryer) industry's competitors position in the Pacific Northwest may be improved provided that: (1) some of the technical concepts are incorporated with certain elementary concepts in economic analysis, and (2) the producer is integrated into the marketing system so that his entrepreneurial decision-making with respect to production and marketing is improved.[1]

In developing our thesis, some of the technical relationships that exist in poultry meat production will be presented prior to the development of economic considerations affecting the maximizing behavior of the poultry meat enterprise.

Technical Considerations

Meat Production Related to Feed Inputs. The growth of various categories of meat birds relative to time and feed inputs under varying controlled

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[1] In our particular problem, separation of production and marketing is arbitrary and indefensible on economic grounds. Production is the addition of utilities to a good in such a manner that the expenditure of utilities at the margin is not in excess of those created. The addition of utilities (production) occurs continuously from the beginning of the production phase until the good is consumed.

conditions should be understood in order to study this problem more adequately. The yield curve in poultry meat production is of the exponential form:[2]

$$W = K + AB^x \tag{1}$$

The marginal product is obtained by taking the first derivative of (1), we get

$$W' = AB \times lnB \tag{2}$$

This asymptotic growth curve equation was applied to experimental data on poultry meat production as illustrated in Figure 1.[3]

Our assumption that the growth schedule relative to feed inputs is of the modified exponential form is given considerable credence by the experimental data cited. Although the data may be criticized for its age, in light of the subsequently developed high energy rations and improved strains, Washington State College poultry technologists informed us that the general nature of the relationships still holds true.[4] The degree of diminishing incremental yields resulting from the application of the variable input factor (feed) in poultry meat production is made evident in Figure 1. Similar relationships were found in milk production and crop production responses to fertilizer application.

Production Function Considerations. Total fryer weight related to total inputs and/or variable inputs encountered in the production of meat birds is of a dynamic nature, since it is necessary that all inputs be reduced to a common denominator—cost. In addition, the economic impact of varying

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[2] This type of curve describes a series whose absolute growth decreases by a constant proportion when $B<1$. In this case the values of the series increase at a decreasing percentage rate. The constant, K, is the upper limit since $A<0$. The sign of A is always negative, because the increments of growth decline throughout the growth period. The constant, A, is the value obtained by subtracting the asymptote K from the trend value when $X=0$. B is the ratio between successive increments of growth. In equation (1) where the growth schedule is related to inputs of feed, W is the total weight of the fryer when X units of feed are applied; K is the limit approached by W as X increases indefinitely; A is the theoretical maximum increase in weight obtainable by increasing X (feed inputs) indefinitely; B is the ratio of succeeding gains in the weight (decreasing geometric series), e.g.,

$$\frac{\Delta^2}{\Delta^1} = \frac{\Delta^3}{\Delta^2} = \frac{\Delta^4}{\Delta^3} = \cdots = \frac{\Delta_n}{\Delta_{n-1}}$$

due to successive unit increments in X. The value of B depends on the size of unit in which X is measured, on the nature of the variable growth factor, and on the conditions of the experiment. This type of yield curve was successfully applied by W. J. Spillman, *Use of the Exponential Yield Curve in Fertilizer Experiments*, Technical Bulletin 348, USDA, April 1933; Einar Jensen, et. al., *Input-Output Relationships in Milk Production*, Technical Bulletin 815, U.S.D.A., May, 1942.

[3] Growth curve plotted from data presented by J. S. Carver, J. L. St. John, T. E. Espinell, and Iva Hansen Flor. "Protein Requirements of Chickens," *Poultry Science*, Vol. XI, No. 1, January, 1932, Tables II and III, pp. 48-52.

[4] Personal discussions with W. J. Stadelman and Leo Jensen, poultry technologists in the Washington Agricultural Experiment Stations.

factor costs on the chicken meat producing industry is not well known or understood.

The type of study needed should attempt to determine output schedules (curves) related to variable costs that exist for the various classes of chickens produced under varying conditions. Experimental data selected for study ought to be categorized according to: (1) degree of confinement, (2)

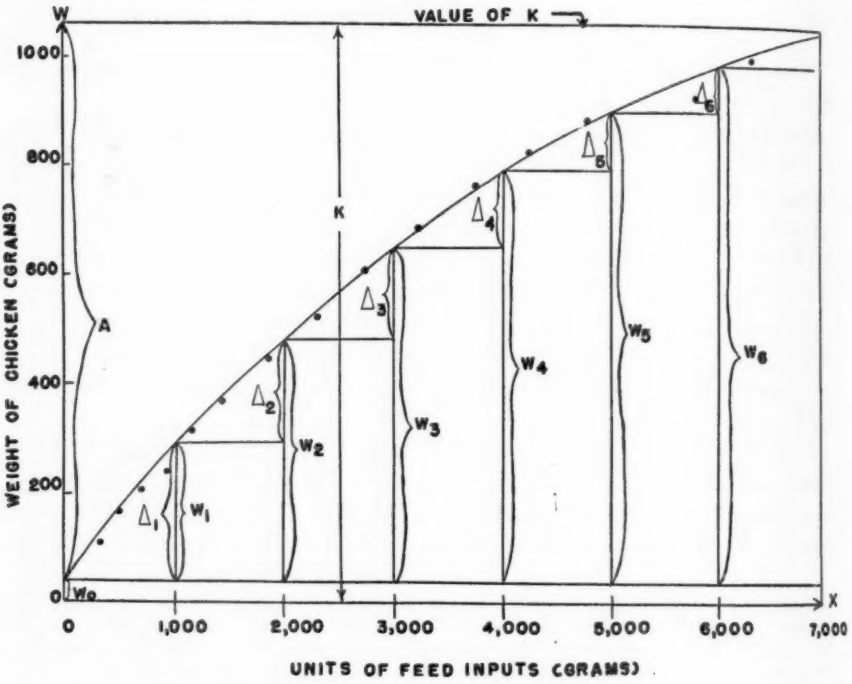

FIG. 1.—CHICKEN GROWTH CURVE RELATED TO FEED INPUTS[a]

[a] Values for the constants in the exponential yield equation were found to be: $K=1{,}060$ grams; $A=-1{,}020$ grams; $B=0.80$.

breed, (3) sex, (4) feeding practices, (5) temperature conditions, (6) quality of housing, (7) strain, and the like so that application of findings may be made to the greatest advantage by growers and others in the industry who contribute to the formulation of production and marketing decisions.

The sex of birds, for instance, *cet. par.*, may have an important bearing on the rate of growth of a lot of meat birds. Male birds tend to grow at a faster time rate than females. It is important that producers be informed as to how much they can afford to pay for sexed males, as compared with sexed females for meat production. The breed of birds likewise has an im-

portant bearing on the rate of growth. In addition, the market price for fryers may vary considerably because of these factors.

The rate of growth for a given input of feed will vary more or less directly with the degree of confinement. Meat of birds which are raised under confined conditions is more susceptible to shrinkage than meat of chickens raised under less confined conditions. This is an important economic consideration. If we assume the same growth schedule (relative to inputs) for two lots of birds, one raised in batteries and the second on a floor, the different degrees of confinement will cause differences in the quality of meat produced. This results in differences in price between the battery and floor-raised birds. The optimum weight at which the two lots should be marketed may be different.

The importance of various production practices and conditions which affect the rate and efficiency of meat production, grade, and the like are all important relative to input costs and product returns. Since these relationships are of economic concern to the fryer enterprise, it is important that their extent be determined under the usual field conditions as well as under controlled experimental conditions. It is unfortunate from farmers', as well as agricultural economists', viewpoints that many of the experimental studies involving the efficiency of poultry meat production have related efficiency only to feed utilization. The physical efficiency of gain ought not all be attributed to feed by assuming that all other production prerequisites must hang in some dimensionless limbus. Feed constitutes the major portion of the costs involved, but by no possible stretch of the imagination all of them. During the early stages of the feeding period, the labor cost is a large proportion of the variable costs. As the feeding period progresses, the proportion of the variable costs that is labor diminishes, as indicated in Figure 2.

In the input-output analysis of fryer production, the inclusion of labor as a variable cost (Figure 2) demonstrates that throughout the growth period of the fryer the marginal physical product per unit of variable cost is less than the marginal physical product per unit of feed cost.[5] The marginal physical product derived from a production function that considers feed as the only variable input would lead the producer to an erroneous estimate of the most profitable time to market his fryers.

In this problem of efficient meat production, we cannot consider the average rate of production over the growth period or periodic sections of the growth curve, because the meat production curve or schedule is not the straight line relationship used by some poultry technologists.[6] Using a

[5] It is shown in Figure 2 that at a given weight, e.g., at three pounds, the marginal physical product at $A > A'$ as indicated by $\theta_1 > \theta_2$.

[6] Cf. E. W. Glasener and M. A. Jull, "Feed Utilization in Growing Chickens in Relation to Shank Length," *Poultry Science*, Vol. 25, 1946, pp. 355–364; M. G. McCartney and M. A. Jull, "Efficiency of Feed Utilization in New Hampshires to Ten Weeks," *Poultry Science*, Vol. 28, 1948, pp. 17–23.

straight line relationship does not permit the application of experimental growth efficiency findings to the practical problem of profit maximization by the poultryman. The point of greatest feed utilization efficiency in meat production usually will not be the point of greatest profit to producers.

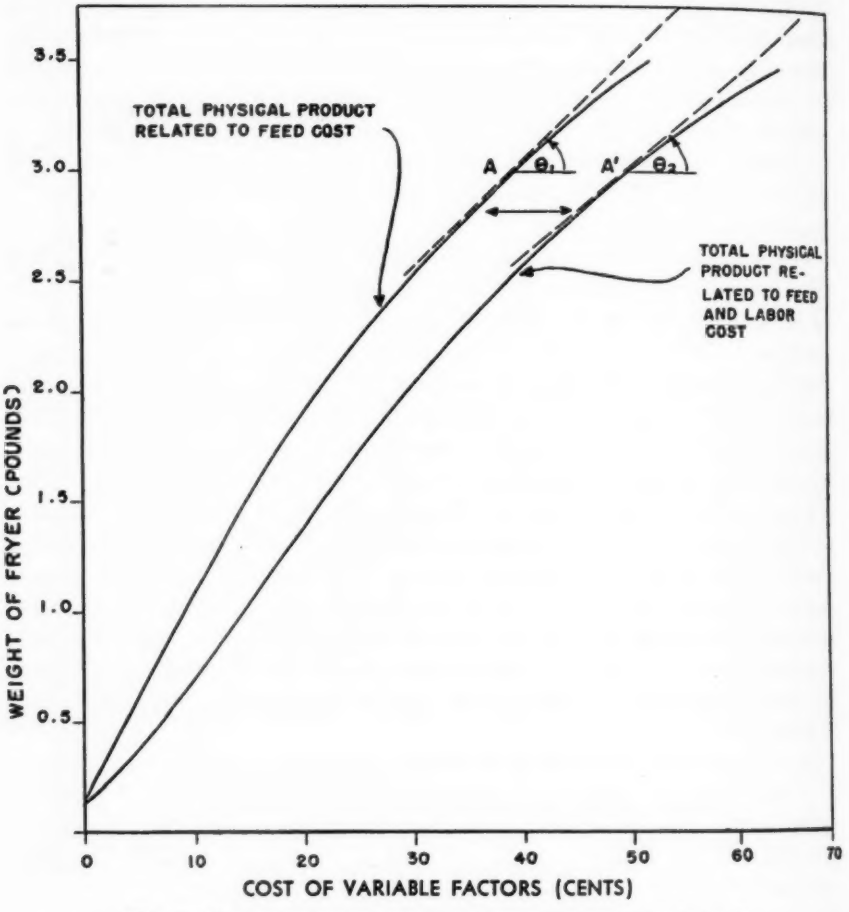

FIG. 2.—INPUT-OUTPUT RELATIONS IN POULTRY MEAT PRODUCTION.[a]

[a] Growth curve plotted from data presented in Table I, p. 98. Feed cost calculated at 4.5 cents per pound; labor was calculated at 1.5/1000 hours per fryer per day at one dollar per hour throughout the growth period.

Practical poultrymen are not concerned with the number of units of carbohydrate or protein required to produce a given number of units of fryer weight, except as they are related to the costs of these inputs and the price of the outputs.

The equating of marginal cost and marginal revenue occurs somewhere in the segment of the growth curve where diminishing incremental outputs

exist. The profit maximizing point will depend upon the relative values of the costs and returns for poultry meat. This fact points to the need for such research to go beyond the most efficient point in meat production as related to feed, labor, and other physical inputs. We must be able to interpret our physical results in money values if we are to secure wide adoption by the industry, because there is little or no significance in defining economic efficiency on a physical basis.

The Problem of Profit Maximization in Fryer Production

Competitive Nature of the Industry. The competitive position of Washington poultry meat producers is affected by many economic factors. Some of the more important ones are (a) cost of production in the local area, (b) price of the meat birds, (c) cost of transportation from competing production areas, (d) cost of production in competing areas, (e) prices of other meat, and (f) consumer preferences for frozen poultry meat relative to fresh poultry meat.

The relative returns to the poultryman depend largely upon his ability to secure an efficient use of his resources,[7] ability to form accurate expectations with respect to the factor and product markets, and a wise use of the best technical knowledge available in the production and marketing practices. In other words, the relative profitability of the firm in poultry-meat production will depend largely upon the level of managerial ability.[8]

Risk and Uncertainty. The poultry meat producer, like entrepreneurs in other endeavors, is strongly influenced by risk and uncertainty and his inability to predict. The ideal would be a condition of certainty, i.e., a single valued expectation (accurately predict one price which will exist at a future date). The poultryman would like to have this condition, but must be content with a condition of risk (distribution of anticipated prices) or uncertainty (probability distributions of anticipated prices). The problem

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[7] For a given size of fryer enterprise the economic model would consist largely of securing the least-cost combination in feed inputs; i.e., securing the point of tangency between the price ratio line and the substitution curve (isoproduct curve). The point of tangency indicates that the marginal rate of substitution of the factors is equal to their price ratio. As the factors' price ratio changes, substitution takes place to maintain the equilibrium position. The shape of the substitution curve (product contour) depends upon the kinds of factors used in production and the nature of the product that is produced by combining these factors.

The proportion of ground feed grains in the fryer ration may be altered to a marked degree without materially affecting its feeding value. These limits are suggested for individual ground grain components:*

Ground wheat	0–20 percent
Ground corn	40–70 "
Ground oats	0–20 "
Ground barley	0–20 "

* Source: The State College of Washington Agricultural Extension Bulletin 329, September, 1949, p. 9.

[8] An excellent but incomplete discussion of the managerial function may be found in Melvin W. Reder's article titled, "A Reconsideration of the Marginal Productivity Theory," *Journal of Political Economy*, Vol. LV, No. 5, October 1947, pp. 450–458.

is that of choosing the modal point of the most probable distribution of anticipated prices.[9] The entrepreneur usually limits his poultry for meat operation in decreasing the degree of risk or uncertainty; i.e., he prefers to have a limited operation, but feels more certain about the area in which his probable net returns will be concentrated.

The above-mentioned constraints are important, because the maximum growth period for a given lot of birds classified as fryers is about 10 to 12 weeks under the present technological stage of fryer production. If the entrepreneur forecasts incorrectly, he is now restricted by time considerations in attempting to compensate for his errors in stochastic expectations prior to securing the given lot of chicks.[10] Producers of meat birds are hampered in the determination of the best time to market their product because of the difficulties encountered in determining input-output relationships and their inability to predict market pieces.

The Role of Credit. Since credit plays an unusually large role in financing poultry meat production in this region, its administrators may act unduly to constrain or expand production conditions in the industry during certain periods. In many cases, the complete feed bill for the production period of a given lot of fryers is financed by local credit sources. The poultryman is often confronted with credit restrictions that affect his production, cost, and profit position. In fact, this factor of capital rationing often prematurely forces the poultry meat producer out of business or prevents the entrance of prospective and possible efficient producers into the business. Capital rationing is induced by lending agencies which, having had previous unfortunate loan experiences with poultry meat producers (who have found it a comparatively simple matter to market the mortgaged poultry through hucksters, friends, or as meat for the family, thereby diminishing the creditors' security to a low level) categorically restrict the issuance of credit. In some cases, the entrepreneur finds his credit cut off and is forced to market his meat birds before the maximum profit position is reached. Thus, credit availability is an important determinant directing resources either into or out of fryer or other poultry meat production, both in the short- and long-run.

Maximum Profit Determination. As indicated previously, during the planning and production period, the entrepreneur operates under the conditions of maximizing expected profits, stochastic expectations, capital rationing, and of other subjective and non-subjective restraints. Under

[9] This problem is similar to that of maximizing gains, or better, minimizing losses in gambling. See Dr. Gerhard Tintner's treatment of subjective risk and uncertainty in "A Contribution to the Non-static Theory of Choice," *Quarterly Journal of Economics*, Vol. LVI, No. 2, February 1942, pp. 274–306.

[10] Cf. Leonid Hurwicz's treatment of the firm in *Theory of the Firm and of Investment*, Cowles Commission Papers, new Series No. 16, 1946. Professor Hurwicz develops the conditions of stochastic expectations when risk and uncertainty are present.

these conditions, the profit maximizing principle becomes the utility maximizing principle. This results because, over the long-run period, the entrepreneur attempts to maximize money profits while decreasing the degree of risk and/or uncertainty facing his operation, to maintain a desired liquid position, and to maximize other non-quantitative items, e.g., leisure. The analysis of profitability of the enterprise in the long-run period should include a production (revenue) function, cost function, and a constraint equation coupled with the Lagrangean undetermined multiplier.[11]

Under constrained conditions, resource use will necessarily be different than under unconstrained conditions; constraints result in an inferior use of resources, i.e., when an amount of some factors of production are prevented from being used. This condition prevents the optimum use of resources, that is, the equating of the ratios of the value of the marginal physical product of each factor to their prices. In the above discussion of maximizing behavior (utility maximizing principle), we have attempted to set forth the problem in its general setting.

In our particular study of maximizing behavior of the poultry meat producer, we are concerned primarily with a short period of time (maximum of 12 weeks). Hence, we can simplify our analysis by just considering money profit maximization from a given lot of fryers. Constraints in the form of alternative costs may be given values and added to the producer's costs for the particular lot of birds. It is recognized that considerable variation in the costs of production of marketable fryers exists at any time because of facilities used, feeding practices, temperature conditions, mortality, and other management practices which may alter intensities of use and combinations of factors.

Application of Marginal Analysis to Profit Maximization for a Given Lot of Fryers

The existence of a condition in which succeeding decreasing incremental outputs per unit of input exist throughout the growth period when meat birds may be marketed indicates the necessity for demonstrating the physical relations and their economic effects on poultry meat production and marketing. This is especially important to the individual producer confronted with costs which are unusually high relative to the price of poultry meat.

Poultry meat producers' opportunities to vary the combination of production conditions (factors) with the changing costs and prices of the resulting products, the least cost combination of factors at any time, are of extreme importance to the producer and the marketing agency which handles

[11] The treatment of maximizing behavior under constrained conditions utilizing the Lagrangean multiplier is demonstrated in Paul Samuelson's *Foundations of Economics*, Harvard Press, 1947, pp. 36–38; 362–365.

his product. In this case, the producer will be interested in securing an equilibrium position at the point which equates the marginal rate of substitution of the factors to their price ratio. Our analysis assumes that the entrepreneur maintains the least-cost combination for every level of input. The process of substitution will take place mainly within the over-all feed ration. Mechanical equipment may be installed to reduce labor costs if the enterprise size warrants this type of decision.

Marginal analysis is applicable in our study of profit maximization for any given lot of fryers, because there exist continuous production, revenue and cost functions; i.e., these functions are differentiable during the period when a given lot of birds may be marketed. The determination of the most profitable time to market fryers is made by applying marginal analysis to input-output, cost, and price data. A recent publication of the Poultry Council of the State College of Washington presented feed input and fryer growth by time periods, as shown in Table I.

TABLE I. INPUT-OUTPUT RELATIONSHIPS RELATED TO TIME[a]

Age of fryers (weeks)	Weight of fryers (pounds)	Feed consumed (pounds)
4	0.7	1.4
8	2.1	5.0
10	2.8	7.8
12	3.5	11.5

[a] The State College of Washington Agricultural Extension Service Bulletin 329, Table 1, p. 9, September, 1949.

The manner in which the above information was presented largely precludes its usefulness to the individual poultryman. The data in Table I become useful only after they are incorporated into an analysis including other information necessary to indicate the considerations involved in maximizing money profits from fryer production.

In determining costs, it was assumed that the only variable costs which exist during the period in which fryers can be marketed are feed and labor. It was further assumed that labor is applied at a constant physical amount each day throughout the feeding period. The following costs and conditions were assumed after consultation with the poultry technologists at the State College of Washington. The data presented in Table II are only illustrative of cost conditions which may reasonably be expected to exist under a farm situation in the Pacific Northwest.

The determination by the producer of the most profitable time to market fryers, using the information in Tables I and II, may be accomplished in several ways: (1) related to weight, (2) related to time, (3) related to aggregate variable costs of inputs. If the physical attributes of a given lot of

birds are known in relation to the input-output relationships, and the effect of the physical production conditions can be determined in advance, the first of these methods may be used to advantage by the poultryman. Since these criteria are probably not satisfied in practice, the first method as demonstrated in Figure 3 ought to be restricted to that of demonstrating the principles involved in determining the appropriate time to market

TABLE II. COSTS IN FRYER PRODUCTION IN THE PACIFIC NORTHWEST, 10,000 BIRDS, 1950[a]

Item	Cost
Fixed costs:	
10,000 day-old chicks	$1,800.00
Housing depreciation	45.00
Other equipment depreciation	220.00
Fuel for brooding	150.00
Miscellaneous costs	180.00
Total fixed costs	$2,395.00
Variable costs:	
High energy ration (per ton)	$ 90.00
Labor at 15 hours per day (per hour)	1.00
Mortality of five percent assumed to occur throughout the growing period	

[a] Costs were figured on the following bases: New Hampshire Red, day-old chicks at 18 cents each; housing valued at 60 percent of current replacement value of $1.00 per square foot of floor space; .75 of one square foot of floor space per bird; depreciation rate on housing at three percent per annum; other equipment, e.g., feeders, waterers, roosts, brooders, buckets, and the like at $220 per lot; 1,000 gallons of fuel oil at 15 cents per gallon; miscellaneous costs, e.g., litter, building repairs, cleaning, disinfectant, and the like at $180 per 10,000 bird lot.

fryers. It should be used by specialists who are attempting to develop a highly integrated fryer production-marketing system.

Time to Market Fryers Related to Weight. The current average market price to producers in this area was incorporated in the revenue schedule. The market price for live fryers used was 28 cents per pound on the farm.

By using the information contained in Tables I and II, and our knowledge of the general nature and relationship of existing cost and revenue schedules in the competitive firm, we have demonstrated in Figure 3 that fryers should be marketed when the average weight of the lot is just less than three pounds. The above analysis further demonstrated that in the vicinity of the three-pound weight, for every change of one cent per pound in market price, the weight at which fryers can most profitably be marketed is altered one-tenth pound; and that, currently, the profit per pound of marketable live fryer to the producer (assuming a mortality of only five percent) is approximately 1.5 cents. This analysis demonstrates the narrow operating and profit margins existing in the fryer enterprise.

In most cases, the poultryman attempts to market his fryers at 3–3½ pounds or at approximately 12 weeks of age. This rough approximation is

not conducive toward a profitable enterprise, especially when feed and labor costs are relatively high or when these relationships change frequently. Carrying the group of birds a fraction above the optimum profitable weight may mean decreased returns or losses to the poultryman. The poultry meat producer in the Pacific Northwest would advantageously market his meat birds at a lower weight, assuming that he can get them to feather and finish properly, if he were made aware of these marginal concepts. This condition would hold true especially in a period when the meat-feed ratio is unfavorable.

Marketing Time Related to Length of Feeding Period. The second method of determining the appropriate time to market a given lot of fryers is

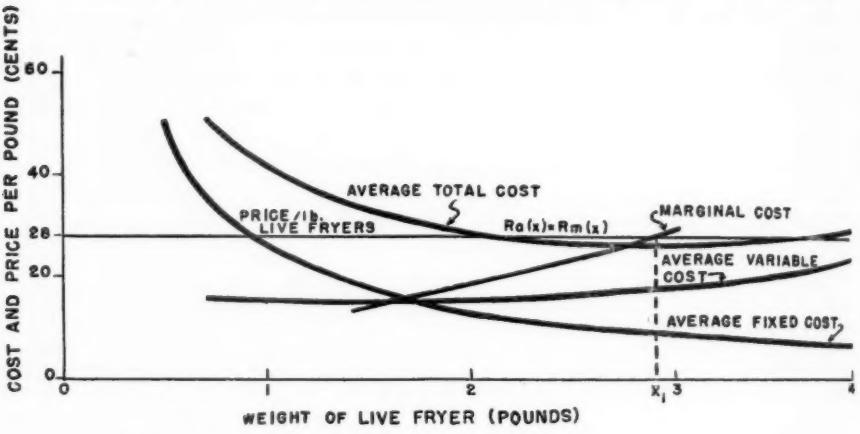

FIG. 3.—DETERMINATION OF THE MOST PROFITABLE TIME TO MARKET FRYERS RELATIVE TO WEIGHT.

demonstrated in Figure 4. In this case, the cost and revenue schedules are related to the length of the feeding period. This consideration may be a very important factor to the fryer producer who attempts to determine how far in advance of the marketing date he will have to begin his production operation. This method could also be used advantageously in an integrated marketing system where the dressing plant desired a uniform product and a predetermined daily output. The dressing plant would have to determine their needed supply about four months in advance to allow for production preparation (including planning) and production.

Using the data in Tables I and II in Figure 4, it is apparent, given the price-cost relationship, that the fryer producer is in a profitable position from the eighth to the 13th week, or from points L to N. The most profitable time to market the lot of fryers appears to be about three or four days after the tenth week of feeding (Point P). The Point P is determined where the vertical distance between the total cost and total revenue curves is at a

maximum.[12] As in the first method, the optimum profit is 1.5 cents per pound, or approximately 4.5 cents per fryer.

Variable Costs—Key to Time of Marketing. The third method, which relates net returns to aggregate variable costs in determining the most profitable time to sell a lot of fryers, is one which is practical for the individual poultry meat producer to use. Likewise, it may be used to advantage by those responsible for the proper integration of a fryer marketing pro-

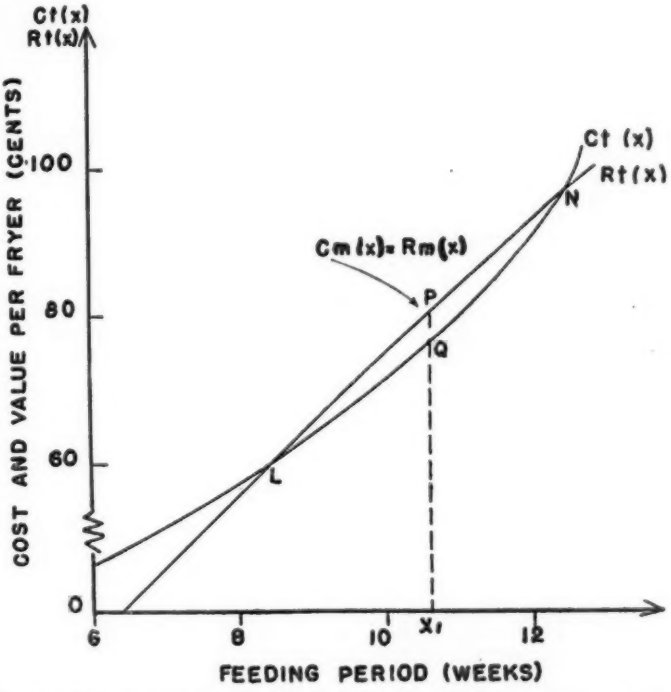

FIG. 4.—DETERMINATION OF THE MOST PROFITABLE TIME TO MARKET FRYERS RELATIVE TO LENGTH OF FEEDING PERIOD.

gram, e.g., management of a cooperative poultry products marketing association. Figure 5 indicates reasons for the desirability of using this type of marketing data determination. Once the aggregate fixed cost per bird is known, the total cost schedule can be located in advance of the production period, assuming an accurately estimated mortality, although the prices of variable cost factors may change during the period.

In order to use this or any other method, the poultryman must keep accurate cost and mortality accounts. Determination of the total revenue schedule is not necessary until the critical period (L to N) is approached.

[12] The tangential slopes to points P and Q are equal, indicating equal first derivatives to the cost and revenue functions, i.e., $Cm_{(x)} = Rm_{(x)}$.

Revenue per bird may be determined by weighing (when they will be least disturbed) a randomly selected sample of fryers which is large enough to indicate the total weight of the various qualities of birds that exist in the lot, with a minimum of sampling error. After determining the proportion of the various grades in the lot and the price obtainable for the various

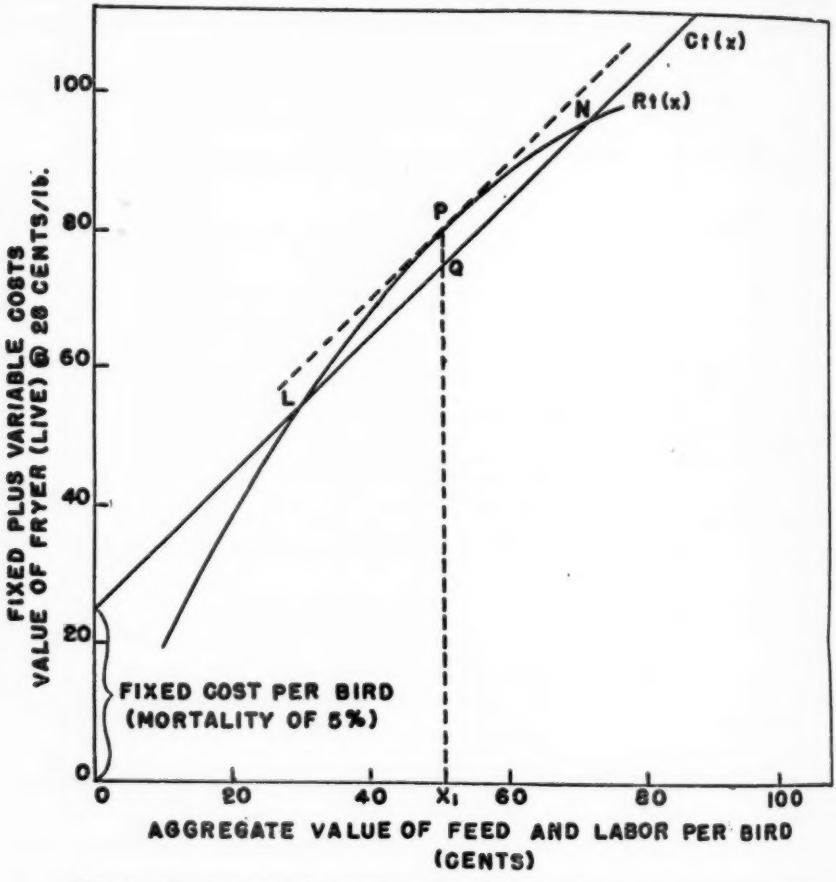

FIG. 5.—DETERMINATION OF THE MOST PROFITABLE TIME TO MARKET FRYERS RELATIVE TO AGGREGATE VARIABLE COSTS.[a]

[a] Tables I and II were utilized in constructing Figure 5.

grades, the total value per bird can readily be obtained relative to the aggregate variable cost per bird. Tables I and II were utilized in constructing Figure 5.

The method of determining the most profitable time to market relative to aggregate variable costs yields the same results as the two methods presented previously; i.e., if the fryer is marketed at X_1, the profit returned

for each bird will be approximately 4.5 cents, or 1.5 cents per pound liveweight. This method of determining the most profitable time to market fryers should be applicable to other meat producing enterprises, e.g., hogs, feeder cattle, and lambs.

Need for Integrating the Producer into an Integrated Fryer Marketing System

It has been observed in the State of Washington that in order to have success in the fryer industry, a high degree of vertical integration must exist (producer to retailer). The reasons are fairly obvious, once the marketing functions in the industry are analyzed and their functional interdependence is understood.

In this region there exists a large potential capacity for raising fryers at the farm level. A favorable price for fryers relative to costs under the conditions of atomistic competition that exist at the farm level can cause and has caused large numbers of potential fryer producers to enter the business of supplying the increased demand. An increased demand by the processing and distributing agencies cannot be satisfied by producers except by increased fryer weights for a period of approximately 15 weeks. This condition is due to the length of feeding period and additional time necessary to hatch chicks from newly set eggs. The fryers marketed by the end of the 15th week following the favorable change in price may exceed the market needs and thereby depress the price. But the new, lower price will not discourage the heavy marketings for another 15 weeks, since the fryers in all stages of the feeding period will continue to flood the market. Hatcherymen may aggravate this disorganized marketing situation by attempting to forestall their losses from expanded output by selling chicks at discounted prices, thereby encouraging continued fryer production at an undesirably high level. The low prices that periodically exist because of market gluts cause growers to attempt to market poorly finished birds. This tends to destroy consumer confidence in the product. The existence of unorderly marketing conditions (market gluts and depressed prices) is not conducive to the achievement of a profitable and expanding industry. Stability would be secured through the elimination of market gluts by coordinating the production and marketing of fryers.

Another important segment of the industry, which has previously been mentioned, is the commercial hatchery. This segment of the industry is noted for its large capacity in relation to output and its high proportion of fixed to total costs. Hatcherymen view the fryer industry as one which could help them considerably to operate nearer capacity. As a result, growers are often encouraged through price incentives and other means, e.g., the extension of credit for the purchase of chicks, to enter the fryer production enterprise, regardless of the needs of the industry.

Another segment of the industry is the farm buyer who has been charged with malpractices resulting from possible indeterminant grading, questionable weighing, and excessive shrinkage. These malfunctions in the marketing of fryers are unlikely to be corrected without a greater degree of integration in the marketing system than is ordinarily visualized by poultrymen, except in the case of some cooperatives. The malpractices mentioned contribute materially to the precarious profit position of fryer producers and to the in-and-out nature of the industry.

The accuracy of grading is important in determining the returns to the fryer producer. If the grading of the birds at time of sale is objective and fair, this service would insure equitable returns to the entrepreneur for his fryers. The grading of the fryers on the margin may mean the difference between positive and negative returns to the fryer enterprise. The difficulties of grading poultry objectively are recognized, as are the temptations of buyers through grading to distort price differentials among grades when supply-demand situations furnish the incentive.

Although federal grades have been developed which introduce a greater degree of objectivity than the ordinary run-of-the-mill grading, buyers have been loathe to use them. Since all buyers are not compelled to use the federal grades, the non-federal grader attempts to out-maneuver his competitors by overstating prices and down-grading, or, through other devices, to confuse the poultryman as to bid comparabilities. Thus, there has developed a system of buying fryers flock-run, whereby overpayments to the alert poultrymen are made up by underpayments to the less astute fryer grower. Under such a scheme, fryers tend to be sold to country buyers who can be "trusted" rather than to those who pay the highest price.

The processor segment of the industry is one which must be run at capacity with its assembly line techniques, or the cost of operation becomes prohibitive. This precludes the possibility of successful sporadic operation or excessive capacity operation. Since the profit margins are narrow, processors must attempt to supply a higher quality product than that which can be shipped in from competitive areas. This is being done in some cases by supplying retailers with packaged, fresh, ready-to-cook fryers. The perishable nature of the product precludes duplication by outside competitors who must be content with supplying the Pacific Northwest markets with iced, New York dressed, or frozen, packaged, ready-to-cook fryers.

The wholesaling segment of the industry must be assured of a certain supply relative to known demands, and the product must be of a uniform quality, or the margin necessary to handle the item will necessarily be large. There is no reason to suspect that wholesalers will be interested in pushing a higher quality product if its supply is sporadic, if at the same time a lower quality product of the same general nature can be purchased at a

lower price in the quantities desired. The abundance of shipped-in frozen fryers from the Midwest in our retail stores is indicative of wholesalers' conduct in meeting the demands of retailers.

Since we have indicated the impact on locally grown, sporadically preduced fryers at the wholesale level of the industry, little can be added that reflects the action of retailers. This tends to be true since wholesalers reflect some of the attitudes of retailers. In addition, however, sporadic supply of a certain product to retail stores tends to increase the costs of marketing as reflected either through greater markups or, more likely, as a low priced featured attraction. When the consumer is not familiar with the product, his acceptance of it is unassured and risky.

Having separated the fryer industry into its various functional components and having described some of these components, we can now proceed to determine the need for a vertically integrated industry. It is our contention that complete vertical integration of the fryer industry in the Pacific Northwest must be accomplished before it will become an industry with any degree of stability, especially at the producer level. Vertical integration should include the following functions: (a) production of fryers, (b) movement of fryers to processing plants, (c) processing plant operations, and (d) sales and distribution because of the following conditions: (1) the relatively long period between the incentives received from the price mechanism and the eventual impact on the price making mechanism by acts of producers, and the large number of individual cogs in the production wheel, each formulating his own production plans in the light of his own imperfectly determined estimate of the supply-demand situation; (2) the narrow profit margins which usually exist in the industry at the farm level; (3) the unsatisfactory grading system; (4) the processing plant's inability to operate at less or greater than capacity without materially increasing the per unit costs; (5) the perishable nature of the product; and (6) the short-time intervals between the time fryers are ready to be marketed by producers and the time they are in the area of decreasing net returns.

The task of aiding and integrating the producer by intelligent direction should not be difficult. The processor-wholesaler is in an excellent position to advise growers and other segments of the industry of the potential demand for fryers at some future period, as reflected by prospective local demand conditions and potential supplies from local and competing areas. This would enable the local fryer grower to produce in accordance with existing and expected demand; hence, fryers will be marketed so that net returns will be maximized. The determination, by specialists employed by a highly integrated marketing system, of the production function for the various strains, breeds, sex, feeds, degrees of confinement, temperature and the like coupled with reasonable accuracy in predictions of the nature

of production and marketing conditions (including prices likely to be encountered during the production period), could be used advantageously in practical application to the individual operation.

An Example of Integrating the Producer into an Integrated Marketing System. An example of successful integration of the fryer producer into an integrated processing and marketing system is the Washington Cooperative Farmers Association.[13] The management of the poultry-meat marketing division of this Association recognized two years ago that success could only be achieved if vertical integration included control over the producer's production and marketing decisions as well as the processing and marketing channels through to the retailer.

The marketers in this instance were able to develop and expand their market for freshly dressed fryers by guaranteeing quality, volume, and dependability to retail channels at premium prices. Growers and marketers now work as a smoothly functioning team. Prior to the effectuation of this marketing plan, fryer production and marketing was a "hit-or-miss" proposition. This condition has been favorably changed for producers belonging to this Association because they are assured of a dependable marketing date and the elimination of grading and weighing abuses which operate to the disadvantage of fryer producers. Also producers benefit through the elimination of excessive price fluctuations resulting from market gluts. There has been an increase in the number of fryer enterprises marketing through this cooperative Association.

The marketing specialists of this Association know of their market needs six months prior to the production period. This is a result of entering into contractual arrangements with their retail outlets. Once the marketing targets are established, the necessary production and time of marketing each lot of fryers is contracted with producer patrons. The Association attempts to secure contracts for such volumes that would enable their processing plants to operate at or near the level of minimum per unit costs.

The fryers are picked up at the farm at a designated time, processed in the plant at a predetermined time and moved through the necessary channels to the retail outlet. The movement is that of an uninterrupted flow, and a high degree of efficiency in the over-all operation is maintained, making possible greater returns to producers.

The marketing association extends the necessary credit for feed. All returns for fryers within a designated period are pooled so that prices to producers are equalized. A provisional payment is made to the fryer grower at the time the birds are picked up at the farm. At the end of each quarter,

[13] The Washington Cooperative Farmers Association's central plant and headquarters are located in Seattle, with branch plants in the important poultry producing areas in Washington.

the final settlement is made on fryers marketed during the particular period. Patrons are constantly advised on production techniques, so that least-cost combinations may be secured in fryer growth. Also, marketers attempt to analyze constantly their marketing situation so that producers may intelligently plan for the future.

A recognized weakness of the integrated system was that the specialists were able to analyze only partially each producer's situation to determine the most profitable time to market prior to the production period. These specialists gave much thought to the problem of profit maximization at the producer level, and requested the services of the authors to develop the appropriate analysis. The incorporation and use of the analysis presented in this paper by the Association's specialists should further increase the profitability of the fryer enterprise.

This case study demonstrates that through sound foresight and prudent management fryer producers may be made better off relative to conditions that would exist under an unorganized marketing system.

FLUCTUATING FARM INCOME AND THE TAX SYSTEM*

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SEVERAL economists have suggested using the tax system to reduce the instability of farm incomes.[1] Most recommendations include the levy of a special additional tax on farmers during prosperity periods to accumulate funds with which to pay subsidies during depression. Several types of taxes have been suggested, including an excise tax on food[2] and one on all farm commodities,[3] and an income tax on all reported income earned from agriculture.[4] Assuming that the incidence[5] of the tax levied is upon the farmer—particularly for the short run[6]—the effect would be to reduce the income of farmers during periods of prosperity; the payment of subsidies would increase the disposable income of farmers during periods of depression. Farmers presumably would benefit because their incomes are "disproportionately" high during prosperity periods and "disproportionately" low during depression periods. Hence, if the assumptions relating to incidence are realistic, the "excess" of farm incomes during extremely good years can be spread over low income years.

In order that this method of farm income stabilization may be entirely farm-financed, the incidence must always be on farmers, regardless of the type of tax levied during prosperity. For example, if an income tax were levied on all earnings from agriculture, farmers would pay the tax without altering total agricultural production or individual crop production sufficiently to cause price changes of agricultural commodities. If an excise tax were used (which probably would be levied on processors), it would be

* The author was on the staff of the United States Bureau of Agricultural Economics when this paper was prepared. He is now employed in the Bureau of the Budget. The views expressed are his own and are not necessarily official.

[1] Geoffrey Shepherd, "A Farm Income Stabilization Program Could be Self-financing," this *Journal*, Vol. 30, February 1948, pp. 142–150; Frederick V. Waugh, "Excise Taxes and Economic Stability," this *Journal*, Vol. 30, August 1948, pp. 399–410; Harold G. Halcrow, "Analyzing the Tax Load of Agriculture—Discussion," this *Journal*, Vol. 31, February 1949, pp. 280–281; D. Gale Johnson, "The High Cost of Food—A Suggested Solution," *Journal of Political Economy*, Vol. 46, February 1948, pp. 54–57; Harold G. Halcrow, and Roy E. Huffman, "Great Plains Agriculture and Brannan's Farm Program," this *Journal*, Vol. 31, August 1949, pp. 497–508; Harold G. Halcrow, "Farm Price Production and Income Policy," *Proceedings* of the Western Farm Economics Association, 21st Annual Meeting, Davis, California, p. 41; and E. Lloyd Barber, "Modifying the Federal Income Tax to Promote Greater Stability of Farm Income," this *Journal*, Vol. 30, May 1948, pp. 331–339.

[2] D. Gale Johnson, *op. cit.*

[3] Geoffrey Shepherd, *op. cit.*, pp. 142–150.

[4] Frederick V. Waugh, *op. cit.*

[5] Incidence of the tax is the point where the ultimate money burden lies. Harold M. Groves, *Financing Government*, rev. ed. (New York: Henry Holt and Co., 1945), p. 121.

[6] It is not clear how much time is expected to elapse before shifting occurs. Shepherd mentions a year or so before the taxes will have production effects. Geoffrey Shepherd, *op. cit.*, p. 145.

necessary for the tax to be shifted[7] backwards to the farmer through the pricing mechanism. As agricultural production is assumed to be perfectly inelastic, that is, insensitive, to changes in both present and expected prices and returns, shifting would either be instantaneous or would require a very small amount of time.[8]

To this writer, the use of the tax system to stabilize farm incomes would be neither entirely successful nor justified. Part of the cost of the plan would likely be paid by other groups through shifting of the tax. The stability achieved would be limited, if not offset, by economic decisions of other groups, including government. In addition, it is doubtful that sufficiently accurate forecasts of future incomes and prices could be made to assure successful operation of the plan.

TABLE I. RELATION BETWEEN NATIONAL INCOME AND NET TAXABLE INCOME, 1946[a]

	Billion dollars
National income	179.5
Income reported (taxable and nontaxable)	134.1
Income reported (taxable)	118.1
Net income (minus deductions)	104.4
Net taxable income (minus exemptions)	64.7

[a] United States Bureau of Internal Revenue, Statistics of Income for 1946, Part 1, Preliminary, pp. 20, 26–27, and 34–50. National income is an estimate of United States Department of Commerce, *Survey of Current Business*, July 1949, p. 10.

Evaluation of Tax Aspects

The assumption of a perfectly inelastic supply of agricultural production does not appear to be realistic when the tax is levied only during prosperity phases of the business cycle. If a tax were levied on only a part of agricultural production, for example, food, there would be a tendency to produce more nonfood crops, with consequent price effects upon all agricultural commodities. An excise tax on all agricultural commodities or an income tax on the income earned from agriculture does not offer a profitable opportunity to alter production between crops. The immediate impact of the tax would be to reduce net returns from agricultural occupations.[9]

For example, an income tax on all reported earnings of agriculture would substantially increase the tax liability of farmers who at present pay a tax. In addition, farmers who are exempt under the present income tax would have substantial tax liabilities. Table I shows the relation between national

[7] Shifting of a tax can be defined as "the processes by which taxes are passed along by certain persons to others. . . . " Alfred G. Buehler, *Public Finance*, 3rd ed. (New York: McGraw-Hill Book Co., 1948), p. 283.

[8] See Shepherd, *op. cit.*, p. 145 and Johnson, *op. cit.*, p. 55, footnote 3.

[9] The discussion in the remainder of this paper is limited to the income tax. Although the levy of other types of taxes may have slightly different effects from those of the income tax, the important arguments are the same.

income and net taxable income in 1946. In that year, net taxable income was 36 percent of national income.

The levy of a proportional income tax would increase substantially the tax base on income from agriculture (that is, the percentage of net taxable income in relation to total income would increase). However, if exemptions were included similar to those in the present income tax, the yield of the proposed tax would be substantially reduced. For example, it is estimated that 53 percent of farm operators had incomes of $1,999 or less, and 70 percent had less than $2,999 in 1948.[10] A farmer and wife who had $2,000 adjusted gross income would pay tax on $800 (deducting two $600 exemptions) under the present tax structure. Their tax liability would be $160 (using 20 percent as the first bracket rate for ease of computation). A proportional income tax rate of 20 percent on all reported income from agriculture would require a farmer to pay an additional $400, or a total tax liability of $560. The difference between payments under this proposal and under the present income tax would be even greater for farm families with children. If a farmer who has two children had an income of $2,000, his tax liability under present law would be zero because of four $600 exemptions; however, under the proposed plan he would pay $400. It appears reasonable that some farmers would consider other activity, especially during prosperity, with such substantial prospective reductions in their living standards in relation to other occupations.

In addition, farmers in a number of cases could increase the proportion of their non-agricultural income which would not be taxed. Because of the lack of alternative occupations, many farmers would be unable to increase the proportion of non-agricultural income; however, in 1948 farmers' income from non-agricultural sources amounted to 5.3 billion dollars.[11] To the extent that the tax would reduce farm prices and incomes, some shifting of the tax could occur through reductions in wages paid to hired labor. The possible adjustments of farmers to the tax include changes in the production of some crops, in increasing emphasis upon non-agricultural economic activity, or in reducing wages of hired labor.

Changes in employment, income, prices, and production, which usually accompany recovery and prosperity phases of the business cycle, increase the demand for agricultural commodities and consequently increase agricultural prices. As the probable effect of the tax would be to reduce production somewhat, changes in demand during prosperity would increase the shifting to other groups.

If consumers' and processors' expectations of future prices are reflected in commodity prices, it is conceivable that all or almost all the tax could

[10] "1947 Survey of Consumer Finances, Part III, Distribution of Consumer Income in 1948," *Federal Reserve Bulletin*, July 1949, p. 783.

[11] Bureau of Agricultural Economics, *Farm Income Situation*, July–August 1949, p. 12.

be shifted to other groups. An example of the importance of dynamic forces on incidence follows:

> During periods of prosperity price advances to take account of the tax can be made more readily than during times of depression and price reaction. French experience, for instance, confirms the view that the general sales tax is shifted to consumers during prosperity.[12]

In summary, farmers may merely increase the proportion of non-agricultural income, increase non-monetary agricultural output, or in some instances leave farming entirely. Because of the tendency to shift part of the tax to other groups through both increases in prices to consumers and a tendency to reduce output,[13] this farm income stabilization plan would not appear to be entirely farm financed.

Evaluation of Fiscal and Economic Aspects

The method of accumulation of the tax yield under this program has important fiscal implications. The problem of accumulation of surplus revenue is only briefly mentioned.[14] In practice, the collection of a tax with a specific provision to make expenditures at some future date will not necessarily effectively reduce the inflationary force of the cumulative expansion during prosperity. The methods used in handling this revenue, general economic conditions, and the general budget position of the Federal Government are extremely important in the analysis of the effects of an accumulation of tax revenues during prosperity.

The tax receipts could be held as a Treasury balance, used to purchase or refund government bonds, or used for general expenditures. If the Treasury should keep the tax revenues as a cash balance, the net effect of the accumulation would be deflationary. The refunding of bonds held by commercial banks would be neutral in that the effect would be to reduce commercial bank reserves when farmers pay the tax and increase reserves again when the Treasury refunds the bonds. Refunding of bonds held by the public would be inflationary or deflationary, depending on the relative spending and saving habits of farmers and bond-holders. If the tax revenue were used to purchase special bonds similar to the trust account bonds, the effect during prosperity would be to increase cash receipts available for current expenditure or debt retirement.

Although there is a close relation between government revenues and expenditures, the two are not necessarily equal, during either prosperity or

[12] Harold M. Somers, *Public Finance and National Income*. Philadelphia: Blakiston Co., 1949, p. 246.

[13] The above analysis is not directly concerned with the type of tax used in collecting the revenue. A general excise tax would have immediate price effects. The income tax, however, would not have any direct price effects until the farmer could make adjustments. These adjustments, however, might be made immediately because of expectations. There is a slight advantage to farmers in favor of the income tax because of the delay in collection of the tax.

[14] Shepherd, *op. cit.*, p. 144.

depression. An additional tax on farmers would in itself have adverse economic effects, but an excess of cash expenditures over receipts would be inflationary and an excess of receipts over expenditures would be deflationary. The accumulation of funds does not necessarily assure in all situations the desired stability, either of farm or nonfarm sectors of the economy.

Because of the complex interrelationships of our modern economic system, any attempt to stabilize one segment of our economy must be considered with respect to the influence of the other sectors. If we assume that the net effect of tax accumulation is deflationary, expansion in the private sector of the economy could easily offset the direct and indirect effects of tax accumulation. Increases in consumption, for example, could offset the deflationary effects of surplus tax revenues.

> For the year 1948 taken as a whole the cash surplus of the Treasury was the only major factor tending to reduce the privately held money supply. On the other hand, other factors offset to a considerable extent the contractive effect of the Treasury cash surplus.[15]

There is no certainty that the accumulation of tax revenue from farmers would have any influence in reducing the amplitude of the prosperity phase of the business cycle.

Payment of a subsidy, as suggested earlier, would increase farm incomes during periods of depression;[16] however, other factors, including the method of financing, will influence the amount of stability achieved. If, for instance, we assume that government expenditures, including the subsidy, are greater than receipts, the effect, both on farmers and on others, will be generally inflationary. If the deficit is financed by bond sales to the public, the tendency toward inflation or deflation will depend on the relative spending and saving habits of bond purchasers and farmers, provided the sale of government bonds does not adversely affect private investment. Monetary policies, however, which assure adequate reserves for commercial banks, can offset the adverse effects on private investment.

The net effect of paying a subsidy to farmers is inflationary and thus increases the stability of farm incomes; however, changes in other sectors of the economy, as in prosperity periods, could dampen the effect of the payment of subsidies upon the entire economy.[17] This discussion is not intended to suggest that the program would not have some favorable tendency to stabilize farm income, but rather to say that the desired stability would not be achieved automatically. Because of other fiscal policies and the spending and saving policies of other economic groups, there is a definite possibility that little, if any, stability would be achieved.

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[15] "Interruption of Monetary Expansion," *Federal Reserve Bulletin*, May 1949, p. 468.

[16] This article is not concerned with the complex problems of payments to farmers.

[17] The above analysis is not a complete survey of the fiscal aspects of the accumulation and expenditure of the tax revenue collected during prosperity. It does point out the necessity of including fiscal and monetary aspects in the evaluation of any stabilization plan.

A further complication of this farm stabilization program is the variation, both in length and amplitude, of business cycles. There would be little assurance that funds collected during a prosperity period would be sufficient to stabilize farm incomes in the next depression. In order to prevent chronic surpluses or deficits of the funds from prosperity to depression, the administrative agency probably would be required to forecast both the duration and the amplitude of the forthcoming prosperities and depressions. Table II illustrates the variations in length of expansions and contractions between

TABLE II. DURATION AND AVERAGE RANKS OF AMPLITUDE OF BUSINESS CYCLES IN THE UNITED STATES, 1918 TO 1938

Peak	Trough	(a) Expansion (months)	(c) Average amplitude of expansions ranked	(b) Contraction (months)	(c) Average amplitude of contractions ranked
August 1918	April 1919	—	—	8	7
January 1920	September 1921	9	6	20	14
May 1923	July 1924	20	15	14	9
October 1926	December 1927	27	7	14	2
June 1929	March 1933	18	4	45	15
May 1937	May 1938	50	—	12	—

(a) Trough on preceding line to peak on following line.
(b) From peak to trough on same line.
(c) Mildest contraction or expansion was assigned a rank of 1, next 2, etc. The ranks were based on three indexes of business activity between 1879 and 1933.

1918 and 1938[18] and amplitude between 1920 and 1933. The length of the expansions varies from nine to 50 months; the contractions from eight to 45 months. The amplitude of the expansions and contractions also fluctuated widely. The expansion between September, 1921 and May, 1923 had the greatest amplitude (15), with the smallest (four) between December, 1927 and June, 1929. The contraction of June, 1929 to March, 1933 had the largest amplitude (15), with the smallest (two) between October, 1926 and December, 1927. The wide variation in both duration and amplitude of recent business cycle phases indicates the high degree of accuracy required to forecast the level of future economic activity. Unfortunately, until now we have not achieved this required accuracy.

Summary and Conclusions

Several conclusions follow from the preceding analysis of some of the taxation, other fiscal, and economic effects of this farm income stabilization plan.

1. This farm income stabilization program will not be entirely farm

[18] Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles*. New York: National Bureau of Economic Research, 1946. Tables 16, p. 78, and Table 156, p. 403.

financed because at least part of the tax levied will be shifted to other economic groups.

2. The monetary-fiscal effects and economic changes of other groups have a direct as well as an indirect influence on the amount of income stability achieved under a farm income stabilization program.

3. The direct and indirect effects of changes in nonfarm economic activity are of sufficient importance to be included in an evaluation of a farm income stability program.

4. Forecasting of the amount and duration of changes in farm prices and incomes is not at present sufficiently accurate to assure successful operation of a plan of this kind.

NOTES

ECONOMIC EFFICIENCY: ITS MEANING, MEASUREMENT, AND APPLICATION TO AGRICULTURAL PROBLEMS

THIS brief note is a report on a special program made possible by the Social Science Research Council under a grant from the John and Mary R. Markle Foundation.

This program consisted of three stages: (1) the preparation of a series of technical papers; (2) the meetings of the participants to present and discuss these papers; and (3) the revision of the materials presented in light of discussion and criticism.

The first stage, which started early in 1950, provided the groundwork for the meetings of the group. The group then convened at the University of Chicago, beginning on June 27 and continuing on through August 11, 1950. The revisions were undertaken in part during the summer and in part after the participants had returned to their respective research (academic or governmental) posts.

I shall not attempt to give the substance of these papers nor the nature and significance of the criticism. The papers will be made available, and in revising them, account has been taken of the critical discussion that emerged. I shall, instead, restrict this note to a few remarks on procedure (which I trust may prove useful to others in organizing similar intellectual ventures), the apparent state of our knowledge in this area, and a listing of the papers.

The Economic Efficiency Series

A number of the following papers are scheduled to appear in technical economic journals and as parts of books. Others are still considered to be tentative and not for publication.[1]

The first four papers listed below endeavor to resolve certain difficulties in the community preference concept and in gauging or "estimating" it. Professor Brownlee's paper, however, goes beyond these issues and gives a representation of production possibilities and of choices and relations between them:

1. "The Meaning of Economic Efficiency in Terms of 'Possibilities' and Choices," O. H. Brownlee, University of Chicago; now with the University of Minnesota.
2. "The Place and Functions of Economic Research in a Democracy," John A. Baker, United States Department of Agriculture.
3. "Social Conditions and Economic Efficiency," Theodore W. Schultz, University of Chicago.

[1] The Social Science Research Council, however, has made it possible to make a modest run of each paper, and accordingly, individual requests will be met as long as the supply lasts. Address requests to: Office of Agricultural Economics Research, Social Science Building, University of Chicago, Chicago 37, Illinois.

4. "Efficiency, Justice, and Freedom," John M. Brewster, United States Department of Agriculture.

Each of the papers in the next group presents the formal economic elements required to analyze a particular type or class of problems:

5. "Conservation and Inter-Period Resource Efficiency," Earl O. Heady, Iowa State College. (To appear in the *Journal of Political Economy*.)
6. "Efficiency in the Production of Marketing Services," Raymond G. Bressler, Jr., Giannini Foundation, University of California. (To be expanded and published as a research handbook.)
7. "Risk and Uncertainty in Relation to Economic Efficiency (including research applications to yield uncertainty)," P. H. Thair, United States Department of Agriculture and North Dakota State College.
8. "Price Movements and the Utilization of Seasonal Farm Products," Lawrence W. Witt, Michigan State College.
9. "Effect of Inter-firm Relations on Economic Efficiency and Measurement," Winn F. Finner, United States Department of Agriculture.
10. "Capital Formation in Agriculture," Earl O. Heady, Iowa State College.
11. "The Scale of the Firm: Its Meaning, Measurement, and Usefulness in Research," David L. MacFarlane, Macdonald College.
12. "The Aggregation of Producing Units in Agriculture in Analyzing Economic Efficiency," Kenneth L. Bachman, United States Department of Agriculture.
13. "Decision-Making: Its Importance for the Meaning and Measurement of Efficiency," George Tolley, University of Chicago.

Two papers by Professor Hildreth present the concept of a decision model and the role of statistical models:

14. "Possibilities and Statistical Analysis," Clifford Hildreth, University of Chicago.
15. "A Model of Farm Production," Clifford Hildreth.

The following two papers report certain research findings in addition to considerations bearing on research procedure. Both of these papers were read before the American Economic Association meeting jointly with the American Farm Economics Association in December, in Chicago.

16. "Relations between Availability of Capital and Production Innovations in Agriculture,"[2] W. E. Hendrix, Georgia Agricultural Experiment Station.
17. "Functioning of the Labor Market,"[3] D. Gale Johnson, University of Chicago.

(Charles E. Bishop of North Carolina State College participated throughout and prepared several of the discussions but not a major paper; Charles Hardin also participated; Herman Southworth and Richard O. Bean of the United States Department of Agriculture, and George Mehren of the University of California each appeared before the group.)

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[2] Published in this *Journal* issue.
[3] Published in this *Journal* issue.

State of the Research Art

The Social Science Research Council's awareness of the needs of Agricultural Economics is of long standing. It has sponsored various enterprises to help improve the research in this area. It early administered a special fellowship program for established workers in this field; it then created a special committee on Social and Economic Research in Agriculture. This committee of distinguished individuals planned the *Scope and Method* series which resulted in 21 publications (15 of these in agricultural economics) prepared and edited by Professor John D. Black. Nor do these exhaust the list of actions taken by the SSRC in behalf of Agricultural Economics. The most recent, of course, is the allocations of some of the Markle Grant to the enterprise covered in this report.

In assessing the state of our research today, I may be permitted to go back to my review of a decade ago of the *Scope and Method* series. I quote from the opening paragraphs:

> A symptom of the immaturity of economics is the wide gap that separates theory and research. In economics, one might well be led to presume that the two approaches are strictly competitive rather than complementary and indispensable to each other. There is the burden of a long tradition of theory versus the empirical, the handicap of an intricate methodology, along with the "temperament" of outstanding teachers, all of which seem to conspire to continue the division of the house against itself. Surely this is a low state of affairs. All too little has been done to bring the two together. Any efforts to do so, even when elementary and cursory in character, should receive encouragement and welcome. . . . Professor J. D. Black (in preparing this series) has addressed himself precisely to this problem of relating the formal aspects of economics to realistic studies.[4]

In reflecting on theory and empirical research in agricultural economics, one observes that these are a few individuals like Samuelson's highly trained athletes who are always in training but never run a race.[5] Most workers in the field, however, do not stop to determine either the purpose or the rules of the race but simply keep on running. The first go stale and the second go on aimlessly.

The papers listed above and the discussions they provoked are a good index of the difficulties in research in agricultural economics. Let me call attention to several of the more important ones.

1. When the research worker turns from production activities, transformation functions, and production possibilities based (primarily) on technical conditions in farm management and marketing, and endeavors to relate these production activities to the preference of the community, he becomes

[4] T. W. Schultz, "Scope and Method in Agricultural Economics Research," *Journal of Political Economy*, XLVII, No. 5 (October, 1939), p. 705.

[5] See Paul A. Samuelson, *Foundations of Economic Analysis* (Cambridge: Harvard University Press, 1947), p. 4.

confused. The concepts are not understood; and the process by which a community—be it markets, the political mechanism, or a slower moving cultural process—coordinates individual preferences is for him an area of social analysis in which he is a novice. Except for economic organizations dependent upon markets, this difficulty plagues all of economics, and the so-called "philosophical approaches" now current are essentially meaningless in resolving this difficulty.

2. Most research workers who have achieved a considerable command of economic theory, both of the micro and the macro branches, find it exceedingly difficult to adapt and use it in analyzing particular agricultural problems. This difficulty is expressed in several ways: theory becomes an end in itself; and empirical work consists of looking for data to illustrate the theory, instead of drawing upon it to formulate hypotheses to get at the economic aspects of the particular problem. Some of the best trained and most competent younger men making a mark for themselves in this field realize with a good deal of discomfort that they have not overcome this basic difficulty.

3. While real advances have been made during the last two decades in bringing economic theory to bear on agricultural problems, the procedures used in identifying the economic variables and in estimating their values are exceedingly crude. This is not to be taken as a criticism of research workers in agricultural economics as such, but as a description of the state of theory and practice in statistical inference. All too little has been accomplished in this area although some promising work is under way.[6] A special program paralleling the one of last summer may well be called for in this area in the near future.

A Word on Procedure

About three months were available before the group convened for preparing the papers.[7] A somewhat longer period would have been desirable. Also it was difficult for some individuals to free themselves from "regular" duties sufficiently. A more basic precondition, however, was satisfied; namely, several of the participants have done some meaningful research and could, therefore, contribute by drawing upon their accumulated intellectual experience.

The tangible product of this program for the present is restricted to the papers listed above, several of which deserve careful study by those doing research in this field. The intangible benefits are not to be underestimated, although it would hardly be becoming to try to list them here, since they

[6] See for example, Tjalling C. Koopmans (editor) *Statistical Inference in Dynamic Economic Models* (New York: John Wiley & Sons, 1950). Cowles Commission Monograph No. 10.

[7] The invitations were extended somewhat over five months ahead of the meetings but it took some time to "discover" the best areas or problems for each to work on.

have gone, in the first instances, to those who participated. The returns on this phase of this research investment by the SSRC-Markle Foundation must be sought and will be found in the future research output of the members of the program.

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PER CAPITA INCOMES ON COMMERCIAL AND NON-COMMERCIAL FARMS

THE income statement for agriculture for 1949 showed that the per capita income of persons living on farms was $765, as compared with $1,520 for persons not living on farms. Figures of this sort are often cited in justification of high level price supports for farm products, even though a large part of the farm population lives on small units which produce so little that no price supports within reason can give the families on them an average level of living from agriculture alone.[1] The question may well be raised, what is the per capita income of persons living on farms having significant income producing ability—that is, on commercial farms?

A limited answer to this question is attempted here by estimating per capita income from farming in each of the seven economic classes of farms defined in the 1945 Sample Census of Agriculture. In order to avoid complicity in the uncritical use of comparisons of per capita incomes, however, we are impelled to recognize some of the leading difficulties of such comparisons.

1. There is so much variation both within agriculture and within the rest of the economy that averages are not very representative of either. Narrowing the agricultural group to include only persons living on commercial farms reduces but by no means eliminates this difficulty on the farm side, particularly since both operators and laborers are still combined.[2]

2. The implied assumption that one dollar of income goes as far for one group as the other is subject to qualification. For example, farm products consumed by the farm family and the rental value of farm dwellings are included in agricultural income at prices considerably below those which a city family would be required to pay for similar food and housing, while on the other hand some services, such as education, are more available in the city than in the country.

[1] If price support were to increase farm income by one billion dollars and the benefits were distributed in proportion to value of farm products sold, incomes would be increased by about $55 per capita on commercial farms (the first four classes of Table II) and by about $4 per capita on non-commercial farms.

[2] In one sense, a comparison of per capita incomes on commercial farms with per capita incomes outside agriculture is a biased one, since it contrasts the productive sector of the farm economy with all of the nonfarm economy, productive and unproductive alike. It is relevant to the question of price supports, however.

3. Data on income are only approximations. For example, cash receipts from marketings as shown in the 1944 farm income statement were 25 percent greater than the value of all farm products sold in 1944 as reported by the 1945 Census of Agriculture (the census figures are believed to be understated). The figure for income of farm persons from nonfarm sources is the roughest sort of approximation.[3] These are the best estimates available, and they are required to be made. One could hardly attribute the difference between per capita incomes of farm and nonfarm persons to errors of approximation alone, nevertheless they limit the usefulness of the data.

4. Such comparisons often imply that per capita incomes in different sectors of the economy should be alike. This is highly questionable, at least on economic grounds. A progressive economy must constantly change the proportions of persons employed in different pursuits. Income differentials are one of the most powerful means of bringing this about in a free society. In their absence the economy either would tend toward stagnation or would be directed by government fiat.

Per Capita Income from Farming, by Economic Class of Farm

The Agricultural Census of 1945 was the principal basis used for estimating per capita income of persons living on commercial farms. Another census has already been taken, but detailed tabulations necessary for making the estimates dealt with here will not be forthcoming for some time.

The income statement for agriculture for 1944[4] gives, together with certain items for persons not living on farms, (1) the income of farm operators from marketings, use of dwellings, production for home use and government payments, (2) production expenses, by major categories, (3) wages paid by farm operators to workers living on farms, and (4) income of persons living on farms from nonfarm sources. As the major step in estimating income on commercial farms, each item of income and expense relating to farming was distributed among the seven economic classes of farms shown in Table II. Income from nonfarm sources and adjustment for inventory changes were not divided among economic classes.

Some important income and expense items were reported for each economic class of farm by the 1945 Sample Census of Agriculture, and the only necessary adjustment was to scale the figures in each class up or down so that the total for all classes agreed with the amount given by the income statement for 1944 (Table I). A frequently used procedure in other instances was to start with the relationship of value of products per farm to an expense item as set forth in census tabulations, and then to move from that

[3] For a discussion of these and other difficulties, see E. W. Grove, "Measurement of Farm Income and Expenditure," a paper presented at the American Statistical Association, in joint session with the American Farm Economic Association, Cleveland, Ohio, December 29, 1948.

[4] *The Farm Income Situation*, July–August 1949.

TABLE I. BASES FOR APPORTIONING AGRICULTURAL INCOME AND EXPENSES IN 1944 AMONG THE ECONOMIC CLASSES OF FARMS

Item	Basis for apportionment
1. Cash receipts from marketings. Value of home consumption	1. Data reported by 1945 Sample Census for each class, adjusted to agree with totals given in the 1944 income statement.
2. Gross rental value of farm homes	2. Arbitrary scores based on number of farms and presence of telephones, electricity and running water, 1945 Sample Census.
3. Government payments to farmers	3. Land in farms in each class, 1945 Sample Census.
4. Wages and perquisites received as income by laborers on farms	4. Number of men and boys 14 years old and older in each class, 1945; average annual wage related to value of products in 1939; hours worked off farm on other farms by farm operators, 1944.
5. Feed purchased Livestock purchased Fertilizer and lime	5. Same as (1).
6. Wages and perquisites paid to all labor	6. Cash wages paid in each class, 1945 Sample Census[a].
7. Operation and maintenance or depreciation of motor vehicles	7. Relation of value of products to expenditures per farm for petroleum products, sample from 1940 Census.
8. Maintenance or depreciation of other machinery and equipment	8. Value of implements and machinery in each class, 1945 Sample Census.
9. Maintenance or depreciation of buildings	9. Relation of value of products to building expenditures per farm, sample from 1940 Census.
10. Net rent to nonfarm landlords	10. Relation of value of products to percent tenants, 1945 Census; value of land and buildings in each class, 1945 Sample Census.
11. Taxes	11. Relation of value of farm to taxes paid by full owners, 1930 Census.
12. Farm mortgage interest	12. Relation of value of products to percent full owners, 1945 Census; relation of value of farm to percent of owners having mortgages and to debt charges, 1930 Census.
13. Miscellaneous operating expenses	13. Total of all foregoing expenses allocated to each class.
14. Farm population	14. 1945 Sample Census.

[a] K. L. Bachman and R. W. Jones, *Sizes of Farms in the United States*, BAE technical bulletin in preparation.

relationship to economic class of farm by using the average value of products in each economic class as a bridge. This procedure was tested to some degree by applying it to expenditures for feed, livestock, labor, and fertilizer and lime (for which census tabulations both by economic class and by value of products were available for 1944) and was found to be reasonably satisfactory in those instances. As might be expected from the definition of the economic classes, the greatest proportionate discrepancies occurred among the last three classes listed in Table II.

Some of the relationships used in allocating income and expenses to economic classes were from the 1940 Census, and in these cases adjustments for changes in prices were necessary. Unsatisfactory bases such as the 1930 Census or arbitrary procedures had to be used for items 2, 3, 4, 11 and 12 of Table I. In total, 88 percent of the income and 94 percent of the expenses were apportioned among economic classes on good or fairly acceptable grounds; the remaining amounts were distributed on highly uncertain bases.

The results of the distribution of agricultural income and expenses in 1944 to economic classes of farms are summarized in Table II.[5] The first

TABLE II. ESTIMATES OF INCOME FROM AGRICULTURE (INCLUDING GOVERNMENT PAYMENTS) RECEIVED BY PERSONS LIVING ON FARMS, BY ECONOMIC CLASS OF FARM, 1944

Economic class of farm[a]	Cash receipts from marketings	Other income of farm operators[b]	Farm production expenses	Farm wages to laborers living on farms	Income of farm persons from agriculture	
					Total	Per capita
	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Dollars
Large-scale farms	4,923	266	2,464	286	3,011	3,189
Commercial, family farms:						
Large	5,119	411	2,775	310	3,065	1,410
Medium	6,218	903	3,395	424	4,150	764
Small	3,144	1,026	1,823	262	2,609	358
Total, four classes	19,404	2,606	10,457	1,282	12,835	811
Small-scale farms	620	451	418	94	747	209
Part-time units	187	326	282	92	323	116
Nominal units	149	327	394	74	156	47
Total, three classes	956	1,104	1,094	260	1,226	126
Total, all classes	20,360	3,710	11,551	1,542	14,061	551

[a] Descriptive names of classes are those used in K. L. Bachman, J. C. Ellickson, W. D. Goodsell and Ray Hurley, "Appraisal of the Economic Classification of Farms," this *Journal*, November 1948.

[b] Value of home consumption, rental value of dwellings and government payments. Inventory adjustment not included.

four classes are considered to be commercial farms, although any distinction of this sort is necessarily somewhat arbitrary. The per capita net income from agriculture of persons living on commercial farms was $811, or 147 percent of the average for all farms ($551). The per capita income

[5] It is of some interest to note that a much simpler way of estimating per capita income from agriculture in each economic class gave practically the same results as the detailed method described here. The alternative method consisted of two steps: (1) the value of home consumption was distributed on the basis of tabulations from the 1945 Sample Census showing the value of farm products used by farm households in each economic class, and (2) the remainder of net agricultural income (including government payments) was distributed according to the value of farm products sold in each economic class, as given in the 1945 Sample Census. The per capita figures comparable to those for the seven economic classes in Table II were $3,103, $1,467, $769, $346, $186, $120 and $75 respectively.

from agriculture of persons living on non-commercial farms was $126, or only 23 percent of the average. Sixty-two percent of the farm population lived on commercial farms as defined here in 1944.

The complete income statement for 1944 for persons living on farms included, in addition to the items given in Table II, a decrease in inventory equivalent to $16 per capita and income from nonfarm sources amounting to $158 per capita. There is no objective basis for allocating income from nonfarm sources to economic classes. If it is assumed, however, that two-thirds of the income from nonfarm sources went to persons living on non-commercial farms, total per capita income in 1944 is estimated to have been about $875 for persons living on commercial farms and about $400 for persons living on other farms. These figures compare (insofar as such figures are comparable) with $693 for the per capita income of all persons living on farms from all sources in 1944, and with $1,311 for the total per capita income of all persons not living on farms.

It appears that in 1944, per capita income of persons living on commercial farms as defined here was below per capita income of persons not living on farms. The difference in terms of dollars was sufficiently great to suggest that the purchasing power of income was somewhat less on commercial farms than in the nonfarm sector of the economy. The same general conclusions would appear to apply to 1949 also, since the increase in per capita income between 1944 and 1949 was 10 percent for persons living on farms and 16 percent for persons not living on farms.

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POINTS OF VIEW IN LAND ECONOMICS AND FARM MANAGEMENT RESEARCH

FARM management itself is essentially a point of view. It is not a physical concept, like cows or acres of wheat—you can't see it or touch it with the hands, or isolate it in the feedlot or the field. The point of view in farm management is primarily that of the operator; first, the present operator. He must first survive before we can successfully dream up a permanent agriculture. After his survival is reasonably assured we can turn our attention to subsequent operators, i.e., to the conservation of agricultural resources for a permanent agriculture.

In general, there are three principal points of view: that of the individual, of the business firm, and of the public. The farm management approach is largely from the individual point of view, although the composite national consideration in the operation of the individual farm becomes a public problem. In land economics we may consider the land from the private

as well as the public point of view. In farm finance as a field we may have all three: work regarding the individual's needs and uses for credit necessitates coordination with farm management; provision of agricultural credit involves the public point of view; and the administration of credit agencies involves the business point of view, either cooperative or corporate. In marketing, individual points of view of consumer and producer converge in the business point of view under public supervision.

The individual point of view makes the operator the unit in farm management as contrasted to the cow as the unit in dairying, the acre in cotton farming, the bushel in grain marketing, and so on. The enterprise and the individual operation in farming are each important to the operator, and have been traditionally so regarded. We have had, and still have more of enterprise research and teaching than of whole-farm research and teaching. One of the greatest teaching difficulties in farm management is that of converting an "enterpriser" (or one who is strictly enterprise-conscious) to an entrepreneur, or one who is whole-farm conscious. The enterprise-conscious student finds it difficult to understand that what is best for the plant or the animal may not always be best for the man; yet the farmer is somewhat familiar with the idea, else the Oklahoma or Texas livestock farmer would produce all choice or prime butcher animals rather than sell the enveloped skeleton to a cornbelt feeder to fill. The enterprise point of view frequently dominates not only the teaching profession in agriculture, but also the research staff and even the administration, making progress in agricultural economics a difficult matter.

Research plans should be formulated in the light of these considerations. Just as the whole-farm point of view is a distinguishing characteristic of farm management, it is also important to know the pattern within which one operates. This gives impetus to *type-of-farming* research, both as to the delineation and continuous reappraisal of area boundaries and as to the recognition and investigation of type farms wherever situated. Of course, knowing the pattern is not enough, for one operates in detail, but the operator must harmonize with the pattern or discover sufficient special reward to justify operation under the handicap of off-type farming.

Basic research in *farm organization* must also be continued in spite of attractive new ideas, or perhaps because of them. Technical input requirements and input-output relationships are continually changing. While labor efficiency is more important than ever before, labor itself constantly diminishes as a percentage of the aggregate total of inputs. Demands for new products create new problems. Adaptations to areas and market factors are also changing. The surplus potato problem is now acute in Steuben County, New York, where 20 years ago hand methods were the rule and prospects for the development of a truly commercial area appeared remote. A west coast market is having its effect on the agriculture of the Great Plains and

western Corn Belt areas, having already changed the farming of the West Coast area itself. High labor costs, mechanization, and new jobs required for pest control increase the significance of *work simplification* (or time-and-motion) studies and make necessary a more careful scrutiny of the relationships among partially interchangeable inputs, to answer such questions as whether fertilizer is cheaper than labor, or owned machinery cheaper than custom work; and if so, what is the best farm organization to take advantage of the difference? Administrative factors such as production-control regulations in support of prices limit the farmer's choice among the physically or climatically possible enterprises. Health or other administrative regulations tend to increase the cost of operation and necessitate changes in farm organization as well as methods of operation.

Type-of-farming information and input-output data provide the framework for farm organization studies and consideration of the relative values of enterprises. The best enterprise is no good unless it contributes to the profitableness of the farm as a whole, either now or in the future, but particularly now, as the future must be discounted into terms of present worth. *Enterprise and practice* analyses must continue to be made in relation to the farm as a whole. That ever present but always elusive factor, or combination of factors, called balance of business, is more important and perhaps more in danger of being upset than ever before. It is still true in some cases that a great part of the cost of operating alternative enterprises will be the loss from failure to produce more of the most profitable enterprise. If curtailment is enforced by administration, costs and capital requirements will rise and whole-farm research become more important.

Much has been said recently about *methodology* and *technology* of research. Many young men are critical of our tools. New proposals, like new enterprises or practices in farming, need to be considered in the light of their contribution to the end result. New methods or techniques are better as they contribute, either directly or through improvement of principles, to the sum total of problem-solving at an equal or lower cost per unit of output. For states that have the background of research, sufficient qualified personnel, and the resources to do it, experimental projects in methodology should be encouraged. For most of us, each new development is likely to come piecemeal as an outgrowth of a particular need and as a by-product of the research itself. As in farm management research, definite measures of causes and results are needed for best evaluation and application of methods. The propensity simply to adopt or transfer certain techniques from other fields should be allayed and such techniques used with caution until we have proved their value. By mere transfer, we got into farm management the use of correlation analysis and analysis of variance, upon which we have sometimes surely placed too much dependence. Recently, we have been also in danger of adopting the sampling techniques of the

physical scientists. There are encouraging signs of tendencies in some quarters to distinguish between the sampling requirements for population census enumeration and those for analysis of relationships. Not having tested the difference against the results, I cannot say whether it is significant, but only offer the hypothesis. At least one station is conducting a research project to determine this. Proposed new techniques impose upon us the obligation not only to study carefully the new but also to weigh the old with equal care before abandoning it. Progress may come more surely through evolution than by revolution.

Methods of collecting data remain basically what they have been in the past. Accounts and accounting, both in simple and complex form, are still in use in research, teaching, and extension, and books on the subject are still appearing. Accounts provide a useful means of keeping in touch with current developments, when used for that purpose, and some stations are now using them as a basis for research, particularly of a historical nature; some valuable research has been done in improving the effectiveness of the simpler accounting methods. Surveys are still widely used for a quick look and even for more thorough analyses. This method retains its advantages of quick cheapness and adaptability to represent average rather than better conditions, although for confidence and accuracy on the individual farm it is scarcely equal to accounting. Questionnaires, tax rolls, PMA records, and other sources of data are useful. None are more dependable than the care and supervision exercised in their collection, the representativeness and adequacy of the sample, and the quality of analysis applied in their interpretation.

Much has been said about the qualifications of farm management, and economics in general, as a science. Objectors have based their claims on adherence to the laboratory method rather than any farm management method of research. From the skepticism of the Greeks, through Bacon's emphasis on fact collection, Newton's summaries of orderliness, and Karl Pearson's probability formulas, to John Dewey's acclaim of experimentation for problem-solving as the mark of modern science, the definition has run the gamut. Even Dewey disclaimed our field as scientific, saying that social planning and control were necessary requisites. Now that Leonard Salter has settled that question by pointing out that true experimentation need not be initiated by the investigator, we may go on measuring, recording, and analyzing the results of individual and group experiments with whose beginnings we had no connection, and still hold our heads high in self-respect as scientists if only we use all information or ideas bearing on the subject and test our ideas in the consequences of the acts to which they lead.

In essence, this is analysis in sequence from cause through action to effect. Experiments initiated by the investigator may be analyzed in time sequence,

but those not conducted under "social planning and control" can be analyzed only under simulated time sequence, or by stage sequence; i.e., by obtaining and studying observations in various stages of development approximating points of time in the sequence through which an individual case might pass in its development from initial cause through action to a stated consequence. Something like this has in the past been called "the comparative method," but it emphasizes the importance of classification of observations by cause rather than by effect, in order that independent causes remain unmixed and stand out clearly in the analysis. In this connection, it is important that we take steps first to make comparable the items we expect to compare. We should avoid defining a family farm in terms of income and then comparing it, for example, with a corporation farm that may have been defined *without consideration* of the *same* criterion. The fallacy is as complex and obscure as the one in the man's 50/50 sausage, composed of one horse and one rabbit. The "comparative method" is not applicable for projection beyond the limits of the data into the unknown, where there are no cases. Only something like a "budget method" can do that, but the above type of stage-sequence analysis can well be used for checking the results as soon as cases appear in the new area, outside the range of the former data. The stage-sequence idea has the advantage over a time-sequence experiment, of being applicable at a given point in time, thus eliminating the complicating fluctuations of many variables associated with the passage of time.

All of these considerations imply the use of actual measurements of cause, of action, and of consequence. Apparently, some qualitative considerations must remain in our research, and considerable subjectivity, but objectivity and accuracy are aided by the ability to measure. However, some of the measures used in the past are subject to severe criticism, if not condemnation. For years, productive man-work units have been regarded as among the best over-all measures of size of business for general use, even when calculated incorrectly. We often assumed that all acres or all animals were of equal productivity, by assigning a fixed standard per acre or per animal. The unit of size in the dairy business is the cow, until the milk is removed, then it is the quantity of milk; in wheat it is the acre, until the crop is severed from the ground, then it is the bushel, and so on through the enterprises. Even with these refinements in functional base, labor inputs at average rates have become less satisfactory than before because labor has been replaced in varying degrees by power and machinery; in short, by capital. In studies of farm practices, this has been somewhat overcome by using as a standard the "most labor-saving" or "most labor-using" practice, but it is difficult to translate this into a measure of size of business. The use of a figure to represent the aggregate annual cost of all input factors combined appears to have some possibilities of usefulness, although it is

still subject to further refinement and testing.

Measures of efficiency in the use of input factors need *considerable* overhauling. Labor efficiency has been a very useful factor but is fast losing ground with the substitution of power and machinery. The old power efficiency factor, productive horse-work units, has disappeared entirely. Some composite index of labor-power-machinery efficiency is needed. Perhaps this will come with the perfection of an input-capacity basis of measuring size of business.

Difficulties of composite measures of rates of production will be partly solved also by establishment of an acceptable measure of size.

The factor of balance is evidently not susceptible to measurement in a single figure, as it means many things to many people under many conditions. Combination of enterprises, conformity of organization to its setting, interchangeability of input factors are only a beginning. Whether it is good balance to utilize "waste" resources depends on the remoteness of the alternative. If the next alternative is close in profitability to the most profitable enterprise, the business will tend toward diversity; if it is remote, specialization is likely to be the result, in which case the best use of "waste" resources will be to let them go to waste.

The aim of farm management research should be problem solving. One result may well be increased efficiency, which, I believe, is not contrary to the consumer's interest nor to the general welfare. Development of a sound body of principles, tested on good and poor soils, under rising and falling prices, and for various types of farming, will add greatly to the stock of tools to be used for problem solving when new situations arise. It is necessary to develop new fields without weakening the basic research. Like the farmer's, our resources are fixed for the time being; we can enlarge our business as we show the value of our results. There are some ways of enlarging without more funds of our own. We must first make effective use of what we have. Cooperative or regional projects are useful in this way if they help us do more work that is important to the people of our state. The question is, "does it fit into our research plan for the state and contribute the most to our program per dollar of departmental expenditures?" We should develop the projects important to our states and regions, then ask for help. Cooperation from the states up is as important as cooperation from the top down.

For the greatest progress, we must maintain a balance between resources and fields. There is a tendency to spread ourselves too thinly because of the temptation to expand into new fields before we have acquired adequate research background. Our real development depends on the service we render to the farm people—on whether our research program gives answers to farmers' problems this year and next.

Another aim is that progressively more of our work should find its way

into courses and research projects dealing with enterprises and aspects of farm life. Close informal cooperation with other departments is a means of bringing this end to pass, as well as a means of enlarging our volume of business without more funds of our own. This emphasizes the need for a farm management man to know agriculture as well as economics.

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FARM TECHNOLOGICAL ADVANCES AND TOTAL POPULATION GROWTH

IN RESPONSE to various personal requests, the present note brings up to date the central table in "Farm Technological Advance and Total Population Growth" which appeared in the August, 1945 issue of this *Journal*.

From 1870 to 1920, total population growth was faster than farm technological advance, as reflected in output per farm worker, with the result that

TABLE I. CHANGE IN FARM LABOR FORCE, AGRICULTURAL PRODUCTION, FARM WORKER PRODUCTIVITY, AND TOTAL POPULATION GROWTH, 1870–1940
(1870=100 for all indexes)

Year	Farm labor force (Persons 10 yrs. old & over)			Agricultural production		Productivity per worker		Total population		
	Number[a]	Index	Percent change[b]	Index[c]	Percent change[b]	Index	Percent change[b]	Number[d]	Index	Percent change[b]
1870	6,849,772	100	—	100	—	100	—	38,558,371	100	—
1880	8,584,810	125	25	152	52	122	22	50,155,783	130	30
1890	9,938,373	145	16	190	25	131	7	62,947,714	163	26
1900	10,911,998	159	10	242	27	152	16	75,994,575	197	21
1910	11,591,767	169	6	276	15	163	7	91,972,226	239	21
1920	11,448,770	167	−1	304	10	182	12	105,710,620	274	15
1930	10,471,998	153	−9	338	11	221	21	122,775,046	318	16
1940	9,162,574	134	−13	378	12	282	28	131,669,275	341	7
1950	7,100,000	104	−22	470	24	452	60	150,697,361	391	14

[a] U. S. Bureau of the Census, *Population* (Sixteenth Census of the U. S.) Series P-9, No. 11, December 8, 1944.
[b] From preceding decade.
[c] For 1870–1940, three year average centered on year indicated. For other years, five year averages similarly centered. Data since 1909 are derived from BAE index of volume of agricultural production for sale and for consumption in the farm home, *Agricultural Statistics 1943, U.S.D.A.* 1950 Farm Labor Force—MRLF April, 1950, Adjusted. 1950 Agricultural Production, Adjusted BAE average for 1948–49–50 preliminary. Data prior to 1909 derived from the Ideal Index computed by Frederick Strauss and Louis H. Bean, Technical Bulletin No. 703, December 1940, "Gross Farm Income and Indices of Farm Production and Prices in the United States, 1869–1937," Table 59, p. 125.
[d] U. S. Census, 1940, Series P-44, No. 21 and 1950 Census of Population.

agriculture was an expanding industry in terms of both total output and farm employment opportunities. Then the worm turned. Farm technological advance began outracing total population growth by the 20's, so that agriculture continued to be an ever more expanding industry in food and fibre output, but a declining industry in terms of employment opportun-

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ities; so much so, that during the 30's, output per farm worker was four times faster than total population growth, with farm employment declining by 13 percent. Then came the five years of hot war followed roughly by five years of cold war, with their terrific impact upon total population growth and unheard of technological strides in American agriculture. The rate population growth jumped from seven to 14 percent during the decade, while farm technological advance, as reflected in output per farm worker, shot forward from a 28 percent increase in the 30's to a 60 percent increase in the 40's, farm employment declining by 22 percent.

To be sure, use of the customary Department of Agriculture series on farm employment and output would give somewhat different percentages than the series used in this paper, but the basic nature of the trend would substantially be similar in both series. The 1870–1950 series is used because it brings into clear focus (as the shorter series of the department does not) the dramatic historical reversal in the relative rates of farm technological advance (as reflected in output per farm worker) and total population growth.

It will be noted, too, that the revised table is still preliminary, since the 1950 figures cannot be "averaged and centered" like the other decades before 1953. It is felt, however, that such final revisions will not materially affect the usefulness of the present results.

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RECENT SUGGESTIONS FOR COST ALLOCATION OF MULTIPLE-PURPOSE PROJECTS IN THE LIGHT OF PUBLIC INTEREST*

THE allocation of joint costs among the various services provided by multiple-purpose projects continues to be one of the more controversial issues in the economic analysis of water resource development programs. Interest in this problem was stimulated during the early days of the Tennessee Valley Authority, and in recent months the issue is once more being brought into focus as a result of extensive studies made by the President's Water Resources Policy Commission.

Despite the consideration given the subject over the years, none of the numerous methods of cost allocation that have been proposed from time to time appears to have gained general acceptance. A substantial part of the difficulty apparently stems from overemphasis of the utility and economic

* The author is indebted to Mr. M. M. Regan of the Bureau of Agricultural Economics, U. S. Department of Agriculture, for his valuable suggestions and helpful criticism. The opinions expressed by the author are his own and not necessarily those of the agency with which he is associated.

significance of allocated joint costs as a basis for establishing charges for project services, and a failure to realize that any workable allocation procedure must be consistent with the principles that govern the formulation of the project.

Once all separable costs such as irrigation ditches or navigation locks have been assigned to the respective services for which they were incurred, full account has been taken of all direct relationships between costs and particular services. The costs for joint facilities such as multi-purpose reservoirs must be covered by the project as a whole, and any apportionment of costs among services should be on a basis that will allow projects to be formulated in such a way as to maximize net benefits.

In a recent statement of policy with respect to the conservation, development, and use of the national water resources prepared by the Water Policy Panel of the Engineers Joint Council, allocation of costs in proportion to use of capacity is again advocated as the method to be followed by federal agencies.[1] As reported in the July 6 issue of the *Engineering News Record*, the Water Policy Panel states, "Distribution of costs in proportion to benefits is improper. Allocation of capital costs among joint facilities should be made by the proportionate-use-of capacity method." In its detailed statement the Water Policy Panel explains that this method requires that each of the multiple purposes served by one structure such as irrigation, navigation, power, or flood control be charged in proportion to the capacity (e.g., acre-feet, cubic-feet per second) to which that purpose is entitled.[2]

A study of this cost allocation recommendation suggests that it is hardly consistent with basic economic principles or with the implications of the over-all conclusion of the Water Policy Panel, that federal projects should be carried out on an efficient businesslike basis and that those who receive project benefits should pay for them.[3] In the discussion that follows, an attempt is made to examine several proposals for overcoming the joint cost problem in the light of this implication. It is assumed that, within certain important limitations, an efficient businesslike basis for carrying out federal projects is in the public interest.

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[1] National Water Policy, a statement of desirable policy with respect to the conservation, development, and use of national water resources, prepared under the auspices of the Water Policy Panel of the Engineers Joint Council June 1950. The constituent societies of the Engineers Joint Council are the American Society of Civil Engineers, the American Society of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Chemical Engineers.

[2] *Ibid.*, Appendix IX, p. 13.

[3] *Ibid.*, p. 5. General Conclusions; especially the following passage: "In its performance of the second function" (aid in financing works for the benefit of a limited number of people) "the Federal Government is basically acting as a banker responsible for the soundness of his loans. . . . It is fundamental to this function that those who benefit directly from the construction of works for the conservation and control of water should repay all costs properly allocable to the production of such benefits. . . ."

Let us take a look at the treatment of similar problems in private industry and see whether we can establish principles that would also apply to multiple-purpose projects. The classical example of a private enterprise that resembles a multiple-purpose project is the department store, which uses a given floor space for the joint sale of different products. Rather than pricing linens and cosmetics in direct proportion to the floor space taken up by the linen and cosmetic counters, the department store manager prices his products so as to maximize his profits. A railroad would not be likely to compose a schedule of freight rates that would require each type of commodity shipped to pay for the joint rail and terminal facilities in proportion to use. Even though the emphasis may not center entirely on receipts from the sale of services, federal projects should still be formulated so as to maximize benefits to the Nation. The proposed method does not promote efficient use of resources in the greatest public interest by assuring a maximum practicable return per dollar invested.

The uneconomic nature of the proportionate use-of-capacity method is illustrated in the table below. This table gives benefit-cost relationships

TABLE I. BENEFITS, COSTS, AND ALLOCATION COSTS OF HYPOTHETICAL MULTIPLE-PURPOSE PROJECT[a]

	Costs	Benefits	Benefit-cost ratio	Percentage of capacity required	Allocation by proportionate use of capacity
	Dollars	Dollars		Percent	Dollars
Flood control alone	100,000	160,000	1.60:1.00	50	65,000
Additional reservoir capacity for irrigation	30,000	60,000	2.00:1.00	50	65,000
Total	130,000	220,000	1.69:1.00	100	130,000

[a] For purposes of clarity separable costs such as those for floodways and irrigation ditches are not shown; the same relationships are obtained if separable costs are included.

for a hypothetical reservoir considered for flood control and irrigation. If the dam were to serve its prime function of flood control alone, the ratio of benefits to costs would be 1.6 to 1.0, while a multiple-purpose structure gives us a ratio of almost 1.7 to 1.0. A private concern would build the incremental capacity needed for irrigation, which has a benefit-cost ratio of two to one, and create an additional $30,000 of net profit. However, under the proposed method of cost allocation, the multiple-purpose project would not be permissible, as irrigation could not meet its allocation of $65,000, and a single-purpose flood-control structure would have to be built.

It is most important to stress that the multiple-purpose project illustrated above in no way involves a "hidden subsidy" of irrigation by flood control. Hidden subsidies are justly opposed by the Water Policy Panel.

The additional costs of irrigation more than pay for themselves as is revealed when the project benefits and returns are examined by increments. Analysis of separable increments is recommended by the Water Policy Panel, and it is evident that their proposed method of cost allocation is not in harmony with incremental project analysis.

To achieve the greatest public good, a multiple-purpose project should be formulated on basic economic principles rather than on any of the numerous methods of cost allocation that have been set forth. These "ground rules," recognized by the Subcommittee on Benefits and Costs of the Federal Inter-Agency River Basin Committee, require that (1) the total of all benefits must exceed the total of all costs, and (2) each separable incremental portion of the project (e.g., additional capacity required for irrigation, flood control, power, etc.), carry benefits in excess of costs.[4]

Although the Subcommittee's suggestions on cost allocation are not to be regarded as the final word on that subject, they appear to be more in line with sound project formulation and with the Water Policy Panel's policy suggestions that beneficiaries pay for their benefits than are the Water Policy Panel's own recommendations on allocation. According to the Subcommittee's recommendations, each service provided by a multiple-purpose project is to be assigned a cost allocation no less than the cost of separate facilities required by that service (e.g., navigation locks and power turbines) and no more than the identical kind and amount of service would cost if provided by a single-purpose project. The exact share of the joint costs to be allocated to any service is determined by the proportion of benefits of that service to all benefits. For allocation purposes, benefits are taken as total benefits less cost of separable facilities attributable to the various services provided.

A fresh approach to the entire problem may reveal that the wisest solution might be to dispense with cost allocation altogether. The possibilities for such an approach are recognized in the Federal Inter-Agency Subcommittee's report but are not elaborated. Repayment could be achieved by basing rates largely on demand for project services, estimated by field studies, as part of the project planning work. The requirement could be retained that all services pay at least for their separable costs and no more than the costs of a single-purpose project furnishing identical services. Repayment for certain group services such as flood control would have to be undertaken by a group of beneficiaries such as a conservancy district.

Should the total of revenues exceed the total of costs, the surplus would revert to the Treasury. If it is evident at the planning stage that repayment would be below costs, the project might still be considered, if there are suffi-

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[4] Report to the Federal Inter-Agency River Basin Committee. *Proposed Practices for Economic Analysis of River Basin Projects*, prepared by the Subcommittee on Benefits and Costs. Washington, D. C. May 1950.

cient intangible or widely distributed benefits such as national defense or recreation for which specific repayment is not feasible. In some cases it might be considered desirable to subsidize certain groups of potential users whose effective demand is so low as to make inclusion of services for them as part of the multiple-purpose project unfeasible. Such subsidies would be made "in the open" and would be usable only toward repayment of project services at higher rates based on the newly strengthened demand. When the cause of the low demand is lack of control over sufficient capital on the part of some potential users rather than inadequate returns from the project, the encouragement or institution of credit facilities might suffice.

The suggested approach would entail more field work at the planning stage, but this would be offset by several advantages. The most important of these would be that this method would aid in the efficient use of resources so as to obtain the highest practicable return per dollar of public investment in water resource development.

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FARMERS' MUTUAL TELEPHONE COMPANIES

CONGRESS provided for a rural telephone loan program in October 1949 when it amended the Rural Electrification Act of 1936.[1] This amendment authorized the Rural Electrification Administration to make loans for the purpose of improving and expanding telephone service to farmers and other rural people. Loans are not to exceed 35 years' duration and will bear two percent interest.

During the first year of operation under the telephone amendment, REA made a total of 41 loan allocations, 14 of which were to telephone cooperatives. As the program grows it is probable that loans to cooperatives will continue to represent a substantial proportion of all telephone loans made. Since farmers' mutual telephone companies are acknowledged as a type of cooperative organization which has existed for more than half a century, a résumé of their development and a description of their characteristics would appear appropriate at this time. Farmers' mutual telephone companies constitute approximately 56 percent of the total number of cooperative organizations serving farmers in the United States.[2] But because of the small number of members per system, they constitute only about four percent of the total cooperative membership.

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[1] Public Law 423, 81st Congress.

[2] Grace Wanstall, *Statistics of Farmers' Marketing-Purchasing Cooperatives, 1947–48*, Farm Credit Administration, Table 43, p. 61.

Historical Development

From the time the telephone was invented in 1875 until the expiration of Bell patents in 1894, there was little activity in the development of telephone service for rural people. The only instance on record was the offering of service in a circular issued by the National Bell Telephone Company on April 26, 1879.[3] This made it possible for groups of people to secure leases of lines for club purposes. Through this opportunity such service was made available to farmers by Morris F. Tyler, then president of the Southern New England Telephone Company operating in Connecticut. But Tyler did not stop with merely developing small farmers' lines; he carried this to its next logical step, namely, the connecting of those lines to the nearest exchange belonging to his company.

After 1894, when urban development was well its on way, telephone manufacturing companies began to realize the opportunity for development of telephones in rural areas. Not long after the turn of the century, one company published a manual which encouraged farmers to develop their own telephone systems on a mutual or cooperative basis. Farmers took to this idea in substantial numbers.

Information showing the value of telephone service was repeatedly brought to the attention of farmers. Manufacturers pointed out that the primary value of the telephone was that it would save time. They suggested ways in which farmers could go about organizing their own mutual companies and gave them ideas as to the type of equipment they would need and the manner in which they could install such equipment. Both the *World's Work*[4] and the *Scientific American*[5] reported how farmers organized to develop their own telephone lines on a cooperative basis. One article appearing in *Country Life in America*[6] gave details on how 14 farmers went about building their lines.

The advent of rural service as well as the continued expansion of service in urban areas early in the 1900's was accompanied by much duplication and by disputes in the urban areas between the Bell System and the independent companies. These conditions led to the public supervision of telephone companies, through state regulatory commissions and the Interstate Commerce Commission. The small farmer-owned mutual companies were not, however, materially affected by such regulation.

As farmers' mutual systems became more numerous, expanding into many rural areas, at least three effects were noticeable. The telephone became a valuable adjunct to the farmer's business, it supplied a social tie, and in addition, it was regarded by many as a source of entertainment. *The*

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[3] *Telephones, 1907, Special Reports*, Bureau of Census, 1910, Chap. VII, p. 75.
[4] *World's Work*, April 1905, p. 6103.
[5] *Scientific American*, February 18, 1911, p. 162.
[6] *Country Life in America*, Vol. 24, May, 1913, p. 68.

Independent[7] recorded how news service became a very valuable feature to those who had telephones in rural areas. At seven o'clock each evening such items as time, weather, market quotations, and local and international news stories were given to all who would listen. Questions were always in order and were answered before the service was closed. Later, *The Outlook*[8] reported that since the telephone was regarded as much an entertainment feature as a business and social asset, it was a generally accepted fact that most people always listened whenever the telephone rang.

In the process of extending telephone service to people in rural areas, two forms of organization were used. These were the "pure mutuals" or nonstock club lines mostly without switchboard service, and the mutuals, which operated switchboards and which were more commonly organized on a capital stock basis. These forms of organization became more distinct as the number of systems and lines increased.

The increasing number of mutual companies brought into existence an increasing number of manufacturers of rural phones, specializing in organization and selling to mutual companies.

By 1912 the number of mutual systems and other rural lines had grown to more than 32,000. Although still continuing to grow in number, these companies at about the time of World War I were beginning to encounter the results of shortcomings of long standing. Principal among these shortcomings was the widespread failure to keep adequate accounts. Farmers who organized these companies thought that the injection of the original capital would allow them not only service indefinitely without any worry of replacement, but also the possibility that there would not likely be even a monthly charge for such service.

The deterioration in rural telephone systems was recognized by equipment manufacturers, the United States Department of Agriculture, and at least one state college. One equipment manufacturer published a manual in 1916 which gave detailed instructions on how rural systems might be revamped. In 1922 the United States Department of Agriculture published a bulletin, *Farmers Telephone Companies*, after studying more than 450 rural companies.[9] Although the bulletin was principally devoted to methods for organizing additional farm telephone companies on a mutual or cooperative basis, it also mentioned ways of maintaining rural lines. The Iowa State College was aware of this problem, especially since many of the telephones in the Midwest were rural and were operated on a mutual basis. To alleviate the problems of poor service and depreciating systems, Iowa State College instituted a course of instruction which was given in various places

[7] "The Farmer and the Telephone," *The Independent*, March 13, 1902, p. 648.
[8] *The Outlook*, August 10, 1907.
[9] I. M. Spasoff and H. S. Beardsley, *Farmers Telephone Companies*, United States Department of Agriculture Farmers Bulletin 1245, December 1922.

throughout the state. The detail relating to the conduct of this course was reported by Frank Gordon in 1915 in the *Technical World Magazine.*

New organizations continued to be formed, and it appears that the high point of approximately 60,000 mutual systems and other rural lines was reached by 1927. Thus, expansion had continued despite problems of maintaining satisfactory service. It was evident, nevertheless, that the deterioration of the previous decade continued; consequently, poor service became quite common among many companies.

Although this trend was general and accelerated during the depression of the 1930's, estimates of systems existing toward the end of the 1930's would support the fact that most companies did not go out of business entirely, but rather operated as best they could under the circumstances. Today a large number of mutual systems and other rural lines are comparatively ineffective and service is relatively poor.

Comparison of Consolidated Income Statements, 37 Indiana Mutuals, 1907–1946

The financial data on mutual companies operating in Indiana as indicated in the *1907 Census of Electrical Industries* appear comparable to data obtained from Indiana companies in 1946. Although conclusive evidence is not available to indicate that the 37 companies are the same for each year, there is definite evidence that the majority of them are the same companies.[10]

In spite of the probable inadequacies of the data, comparisons shown in Table I reveal the changes during the intervening 40 years. First, it may be noted that, although revenues increased approximately four times, expenditures increased over five. In both years, practically no attention was given to depreciation as an expense. If depreciation were considered as an expense, there would appear to have been losses in each case with the more recent year in the comparison showing the greater loss. Toll service rose from a minor to a major source of revenue. This is generally attributed to the development of the repeater, vacuum tube, and loading coil since 1907. Assessments and dues, which were the major source of revenue to these companies in 1907, have become much less important over the years.

The expense pattern also has changed in some respects. Wages and salaries were a larger share of the expenses in 1907 than in 1946. Taxes increased from 1.8 percent of the total expense in 1907 to over 16 percent of the total in 1946. Although maintenance had increased more than six times, it represented approximately the same percentage of total expenses in 1907 as in 1946.

[10] All companies that were surveyed in 1946 were established before 1900; the total number of such companies reporting from Indiana in 1907 Census was 37. This would seem to justify the comparison.

Financial and Legal Aspects

The financing of farmers' mutual telephone companies during the early 1900's was usually handled by members themselves. Each farmer would buy one share of stock in the local company at the customary sum of about $25. The combined capital from this sale of stock made possible the purchase of necessary materials. In instances where farmers could not muster sufficient capital, a common practice was that businessmen of the community purchased such stock, recognizing the benefit to their business of being

TABLE I. A COMPARISON OF CONSOLIDATED INCOME STATEMENTS FOR 37 MUTUAL TELEPHONE COMPANIES OPERATING IN THE STATE OF INDIANA, FOR THE YEARS 1907 AND 1946

	1907		1946		Number of times 1946 is of 1907
	(Dollars)	(Percent)	(Dollars)	(Percent)	
Revenues	(64,254)	(100.0)	(267,613)	(100.0)	4.2
Exchange Service	26,364	41.0	143,407	53.6	5.4
Assessments and Dues	37,487	58.3	43,376	16.2	1.2
Toll Service	—	—	69,641	26.0	—
Other	403	0.7	11,189	4.2	27.8
Expenses	(54,076)	(100.0)	(279,554)	(100.0)	5.2
Salaries	5,084	9.4	15,366	5.5	3.0
Wages	31,028	57.4	99,558	35.6	3.2
Maintenance	10,829	20.0	66,153	23.7	6.1
Rent	2,478	4.6	5,521	2.0	2.2
Taxes	979	1.8	45,372	16.2	4.6
Interest	688	1.3	335	.1	.5
Other Expense	2,990	5.5	47,249	16.9	15.8

able to communicate with farmers. In these cases, however, farmers soon purchased most of the stock held by others.

There is no indication that farmers' telephone companies have ever used credit to a large extent for improving or expanding their systems. In 1937 a study of the credit used by companies operating switchboards indicated that, although about 13.5 percent of all such companies had borrowed some money, the total amount borrowed represented less than two percent of their total investment.[11] The largest amounts were borrowed by companies operating in the Great Plains.

Although the Bank for Cooperatives of the Farm Credit Administration has been in a position to make loans to farmers' mutual companies, not more than a handful of such loans were made. These were made during the late 30's and early 40's for amounts ranging from $1,500 to $10,000. A four percent interest rate, limited amortization period of 10 years, and high equity requirements discouraged mutual companies needing credit most from obtaining loans.

Of 1,292 telephone associations reporting their legal status in the Bureau

[11] Unpublished data, Farm Credit Administration.

of Labor Statistics survey of 1936,[12] 787 were found to be incorporated and 505 unincorporated. The small service lines were more likely to remain informal associations. Actually, the greater part of farmers' telephone companies were organized before cooperative laws were enacted. Consequently, the associations that were incorporated were usually incorporated as stock companies under the general corporation act even though they have, in practice, operated as mutuals.

It has been the usual practice of state regulatory commissions to exempt pure mutuals from regulation. Some regulations imposed by state commissions place obstacles in the way of completely cooperative practice. An example of this is a state commission maintaining that non-members and members be served at the same rate. Since members pay membership fees in addition to the cost for their service, they, in effect, are required to pay higher rates than non-members.

Contacts with state commissions indicate that although they ordinarily have jurisdiction and regulatory powers over small mutual companies operating in their respective states, their policies of regulating these systems vary widely.[13] The following comment was received concerning the West Virginia Commission's policy:

> The Commission . . . has jurisdiction over the farmer owned telephone companies but apparently up until this time has not exercised this authority and has practiced a very definite hands-off policy. . . .

An inspection of the Wisconsin Commission policy reveals that at least one state considers its jurisdiction over mutuals seriously. A report stated that:

> . . . any 'switched' or 'road side' telephone company, even though mutual and without charter is subject to commission jurisdiction and as such may be required to serve a zone, members or not, within its service area.

On the other hand, in a report on commission regulations in Oklahoma, it was stated that "The Commission does not have any jurisdiction over the mutuals." Further, a report on Missouri indicated its commission jurisdiction not to include " . . . farmer owned mutuals and/or cooperatives."

This brief statement of the development and characteristics of farmers' mutual telephone companies is an attempt to present the background of a portion of the job which the REA is undertaking as it proceeds to administer the rural telephone loan program. As the program grows, REA-financed telephone cooperatives may find these comments concerning farmers' mutual companies of some assistance as they prepare to provide the best possible service to the widest practicable number of rural people on a sustained basis.

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[12] Florence E. Parker, "Cooperative Telephone Associations 1936," *Monthly Labor Review*, February 1938, p. 393.

[13] The statements quoted are extracts from letters of REA fieldmen who had contacted the respective commissions.

A NOTE ON "UNDEREMPLOYMENT" IN AGRICULTURE

A GOOD deal has been said about "underemployment" in agriculture, but so far as I know the concept has not been formulated in elementary economic terms so that students (and readers of agricultural economic literature) always know exactly what the term means or what the concept implies. In one respect it would be more appropriate to use the term "overemployment" because the concept implies that *too much* labor is being used. But if one wishes to denote a specific category in addition to the unemployment and full employment categories, the term "underemployment" may suffice rather well. It should be noted, however, that the term has a somewhat different meaning in connection with the agricultural problem than it does in the Keynesian literature.

The term "underemployment," as used in agricultural economics literature, usually denotes a situation in which employment results in lower per capita earnings than could be had if the labor were employed elsewhere. The notion of underemployment is presented graphically in Figure 1. The labor market for the economy as a whole is conceived as being divided into two separate and distinct markets, one for agriculture and one for industry or the non-agricultural sector.[1] If the labor market were perfectly competitive and frictionless, both agriculture and industry would face the same labor supply curve (e.g., S_{a+i} in Figure 1), and there would be no underemployment. But for various reasons, it is presumed that the schedule which agriculture faces is not available to industry.

The labor supply and demand curves for agriculture are S_a and D_a respectively and the equilibrium levels of wages and employment are W_a and E_a. The labor supply and demand curves for industry are S_i and D_i, and the equilibrium levels of wages and employment are W_i and E_i. If the markets were merged in a homogeneous manner, the curves S_{a+i} and D_{a+i} would prevail, and W_{ai} would be the universal wage.[2]

The curve D_f in Figure 1 (b) is the demand of a farm firm for labor and is presumably based on the marginal productivity of labor and the price of the farm product (s) in some manner. If this firm faces the marginal factor cost curve provided by the agricultural labor market (W_a), it will employ an amount E_3 of labor. If it faced the industrial labor market, it would employ E_1 of labor. If the labor market were atomistically competitive and homogeneous, the firm would employ E_2 of labor at a wage of W_{ai}.

The amount of employment denoted by E_2E_3 (E_3 minus E_2 in Figure 1b) is called "underemployment" because this labor could presumably transfer its propensity to work to the industrial market and thereby increase its

[1] The term "industry" will be used to denote the non-agricultural part of the economy.

[2] The curves are entirely hypothetical and nothing is implied about the true shapes of the revenue and product functions.

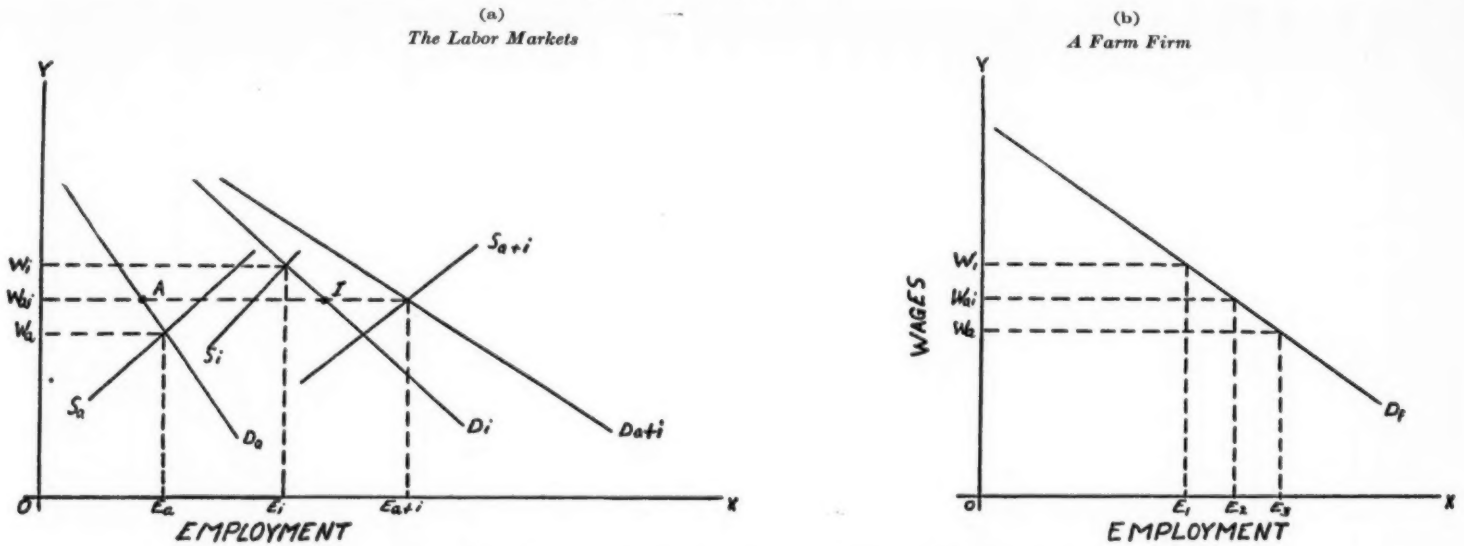

FIG. 1.—GRAPHIC PRESENTATION OF "UNDEREMPLOYMENT" IN AGRICULTURE

EMPLOYMENT

Wi —Industrial or non-agricultural wages
Wa —Agricultural wages
Wai —Wages if the markets were not separated
Sa —Supply of labor to agriculture
Si —Supply of labor to industry
Sa+i —Total supply of labor
Da —Agriculture's demand for labor
Di —Industry's demand for labor
Da+i—Total demand for labor
Ea —Employment in agriculture

EMPLOYMENT

Ei —Employment in industry
Ea+i—Total employment
Df —The firm's demand for labor
E_1 —Employment by firm at wage Wi
E_2 —Employment by firm at wage Wai
E_3 —Employment by firm at wage Wa

wage to W_{ai}. At the same time, those workers remaining in agriculture would also have their wage increased to W_{ai}, while industrial workers would have had their wage decreased from W_i to W_{ai}.

One of the solutions to this disparity in earnings would involve means of shifting the S_a curve to the left until it intersected D_a at point A, and means of shifting the S_i curve to the right to intersect D_i at point I. Another possibility would be to provide means for shifting curve D_a to the right until agricultural and industrial wages were equal.

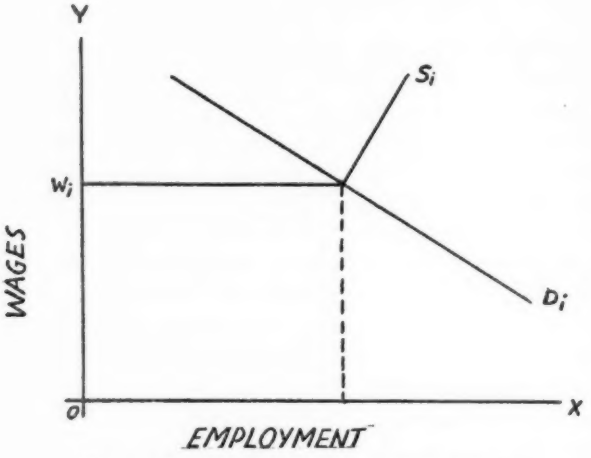

FIG. 2.—THE KEYNESIAN LABOR SUPPLY CURVE

This formulation usually leads to the conclusion that the way to equalize earnings or wages is to transfer labor from agriculture to industry. The first task, then, is to induce some of the suppliers of agricultural labor to alter their labor supply function. But this is only part of the problem. Suppose that instead of the industrial labor supply function shown in Figure 1 (a), a labor supply function such as that posited by Keynes is more relevant. The Keynesian labor supply function, as influenced by labor union action, governmental regulation, et cetera, is shown in Figure 2. Even if we assume that there is full employment in industry (at the point where the S_i curve ceases to be perfectly elastic), a shift of labor from the agricultural to the industrial sector will not be an advantage unless something can be done either to alter the shape of the S_i curve or the position of the D_i curve. Unless one of these alterations is made, a shift in the agricultural labor supply curve will be a disadvantage rather than an advantage.[3] If the industrial section happens

[3] I am ignoring the question of whether a shift in the labor supply functions would be an advantage to society as a whole. This question involves the shapes of the utility functions common to agricultural and industrial products. I am also leaving aside the dynamic effects of such shifts on the subsequent demand for agricultural and industrial products. If we were to follow a policy which entailed the shifting of two million self-sufficient farmers out of agriculture,

to be at a position of less than full employment, the situation becomes even worse. This type of labor supply action is probably too strict to use as a general case, but precisely this situation does exist in many trades and areas and undoubtedly operates to hamper the equalization of returns between agriculture and industry.

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AN ECONOMIC ANALYSIS OF SOME EMPIRICAL DATA ON CROP ROTATIONS

TOO often in the past it has been assumed that a given set of yield data from a crop rotation experiment permitted the recommendation of a single rotation as the one most profitable under all conditions, as long as the input-output relations or production function remained unchanged. That is, the effect of changing price relationships between crops included in the rotations has often been neglected. The authors of this note have attempted through the use of empirical data to demonstrate how changing price ratios affect recommendations which can be made on the basis of the results of rotation experiments.

The Morrow Plots, which are located on the University of Illinois campus, are reputedly the oldest experimental soil plots in America. The soil is a brown silt loam, known as Muscatine silt loam, and is representative of a vast area of prairie land in central and northern Illinois. Although no yield data were recorded prior to 1888, when the Experiment Station was established, the plots are known to have been under continuous operation with approximately the same cropping systems since 1876. The first of the three plots in the experiment has grown corn every year, while the second plot has grown corn and oats alternately with a sweet clover catch crop following the oats. The third plot has grown a corn-oats-clover rotation since 1901 and a similar rotation prior to that time.

On half of each plot all crop residues except roots and stubble have been removed, and no manure or fertilizer has been added. On the other half crop residues have been removed, but there has been returned to the soil an amount of manure which could reasonably be expected to have been produced if the crops and crop residues from the plot had been used as feed and bedding. In addition, lime and phosphate have been applied at rates normally used by farmers in the area. Since the authors have been concerned principally with comparisons between rotations, no attempt has been made to analyze the nature of returns from the use of fertilizer.

there would probably be a significant increase in the market demand for food. The subsequent effect upon the demand for labor will depend upon the rate of substitution between labor and other factors. (See J. R. Hicks, *Value and Capital*, Chapter VII.)

Several published reports interpreting the results of the rotation experiments have been issued by the University of Illinois.[1] Bauer and Farnham[2] combined a set of prices with the 1904–1944 average crop yields to get gross crop values and obtained results which showed that the three-year rotation (corn-oats-clover), either with or without soil treatments, was clearly the most profitable of the three. The authors of this paper have used a second set of prices representing a change in relative prices, with the result that the three-year rotation was found still to be the most profitable where no soil treatments were applied, but the two-year rotation yielded greater returns where fertilizer applications were made.

The results suggest that fertilizer applications may be more important than the crop rotations themselves in maintaining the level of crop returns. Data obtainable from the Morrow Plots on the timing and rates of application of fertilizer, however, did not justify an attempt to show just how much net advantage might be gained. It is significant that the soil treatments employed have been such as to maintain a slight upward trend in corn yields even when corn was grown continuously, whereas the three-year rotation with no soil treatment has permitted yields to decline. While rotations do contribute to the maintenance of high yields, the rotation technique alone is not enough.

A study of Illinois prices of the three crops included in the rotations indicates that the prices of hay and oats have tended to rise more slowly since the experiment was started than has the price of corn. From the standpoint of the economics of crop rotations, this can only mean that those rotations providing for a high percentage of the land in corn (rather than in oats or hay) are coming to be relatively more profitable in comparison with those with lower percentages in corn.

Agronomists have shown that, using the first set of price ratios, continuous corn proved to be the most profitable of the three rotations in the early years of the experiment. It appeared when due allowances were made for the original starting date of the experiment that continuous corn with fertilizer had proved more profitable than either of the other two rotations with fertilizer for approximately 30 years. When the nature of the economy is such that major changes in the price structure are likely to occur frequently, however, it appears doubtful that many farmers are in a posi-

[1] See, for example, the following: F. C. Bauer, A. L. Lang, and C. H. Farnham, "Crop Rotations, Soil Management Practices, Nitrogen Studies," Mimeograph AG1150rev., Department of Agronomy, University of Illinois, 1949; F. C. Bauer and C. H. Farnham, "The Morrow Plots, America's Oldest Experiment Field, Established in 1876," Mimeograph AG948, Department of Agronomy, University of Illinois, 1948; E. E. DeTurk, F. C. Bauer, and L. H. Smith, *Lessons From the Morrow Plots*, Bulletin 300, University of Illinois Agricultural Experiment Station, 1927; and "Field and Laboratory Investigations in Agronomy," Mimeograph AG1400, Department of Agronomy, University of Illinois, 1949.

[2] Mimeograph AG948, *Op. cit.*, pp. 5 and 6.

tion or are inclined to give much consideration to measures or practices which promise to increase their returns only after 25 to 30 years.

The fact that relatively little is known about the cost of rebuilding the fertility level of depleted soils makes it difficult to decide whether it is more profitable to "mine" soils in one period and rebuild them in another or to maintain them at a given level of productivity. It would appear that, if it were possible to predict with any degree of certainty the ups and downs of the general price level, the farmer could perhaps maximize his profits by building up the fertility of his soil in times of low prices and by depleting it in times of high prices.

Stevenson[3] applied a set of prices to some theoretical yield data for eight rotations worked out by the University of Illinois Department of Agronomy. These rotations varied in intensity from 25 to 66 percent of the land in corn. He calculated the gross annual crop returns per acre and deducted from them the costs of the fertilizer required to maintain the same original levels of soil productivity for all rotations.[4] He showed that at both the 50- and 100-bushel theoretical corn yield level the rotation with 66 percent of the land in corn was the most profitable. This was true both before and after deducting the costs of maintenance fertilizer.

To conclude that the relationship between the profitableness of the rotations compared would continue indefinitely is to assume that the estimated yields could be maintained over a considerable length of time, merely through the use of maintenance levels of fertilizer applications. This assumption may not be valid where a rotation returns to the soil only a small quantity of organic matter. Morrow Plot data have already indicated, however, that fertilizer alone has kept yields moving upward over a long period of time even on the continuous corn "rotation," where, indeed, very little organic matter is returned to the soil.

Stevenson went on to show the corn yield level at which each of the other rotations would be as profitable as the Bauer eight-year rotation.[5] This was done graphically by holding constant at the 100-bushel corn yield level the gross returns less maintenance fertilizer costs from the eight-year rotation. The corn yield level was shown on the X axis and returns on the Y axis. For each rotation a diagonal line was used to connect net returns at the 50- and 100-bushel corn yield levels. The point on the X axis above which the line crossed the level of returns for the eight-year rotation, which was a

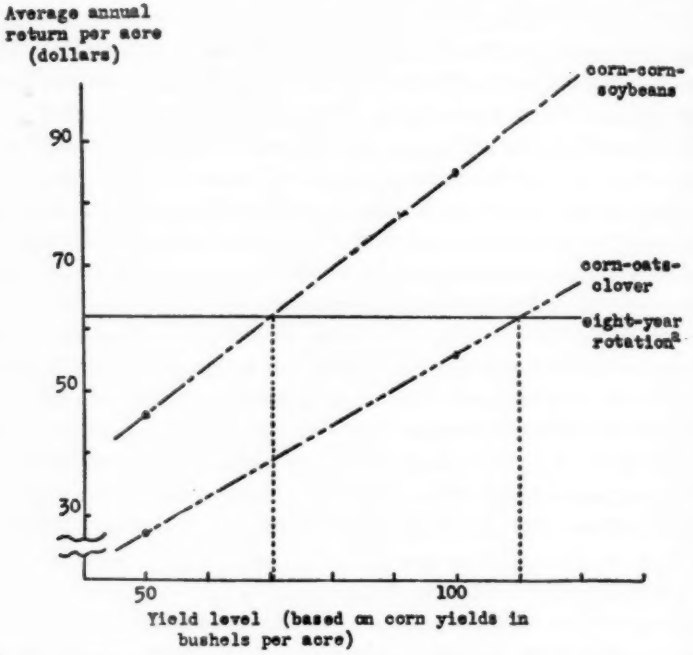
[3] W. N. Stevenson, "The Economic Aspects of the Fertility Balance Technique in Land Use Planning," unpublished Master's thesis, Department of Agricultural Economics, University of Illinois, 1950, pp. 64 ff.

[4] The data on which maintenance fertilizer requirements and costs were based may be found in Roger H. Bray and S. W. Melsted, "Maintenance Requirements for Fertile Soils," Mimeograph AG1359, Department of Agronomy, University of Illinois, 1948.

[5] Bauer, the agronomist who designed this rotation, considered it to be an ideal one because it provided for only 25 percent of the land in corn and a high percentage of the land in legumes.

horizontal line, indicated the corn yield at which that rotation was equally profitable with a 100-bushel yield using the eight-year rotation.

The authors used this same technique, but applied a set of prices which appeared to be more realistic in terms of the long-time price trends than the set used by Stevenson. The results showed, for example, that a corn-corn-soybean rotation yielding 71 bushels of corn per acre would return as much as a corn-oats-clover rotation yielding 110 bushesl of corn per acre. That is to say, the relative *values* (yields times prices) of the crops included in



[a] Corn-soybeans-oats (sweet clover)-corn-soybeans-oats-alfalfa-alfalfa.

FIG. 1.—CORN YIELD LEVEL SHOWING RELATIVE PROFITABILITY OF ROTATIONS

the rotation were the important factors in determining which of the rotations was the most profitable. This truth followed logically from the two analyses of the authors and Stevenson, since the ratios between individual commodity prices differed significantly in the two cases.

The failure to relate the results of agronomic experiments to current economic phenomena has tended to lead to incomplete or even erroneous interpretations. There is some evidence that the causal relationships between variables in the experimental data cited may not yet have been identified accurately. The question is raised as to the relative importance of rotations and fertilizer applications in determining crop yields. Furthermore, the

choice of rotations purely on the basis of the difference in physical yields observed under experimental conditions may not permit the farmer to maximize his crop returns. The authors' application of various sets of relative crop prices to yield data from rotation experiments has demonstrated that relative yields and relative prices are equally important in the determination of the most profitable rotation. It is felt that there is a need for better coordination of agronomic and economic principles in the design and interpretation of agricultural experiments.

W. JAMES FOREMAN
GEOFFREY A. HISCOCKS

University of Illinois

PUBLICATIONS RECEIVED

*Boulding, Kenneth E., "A Reconstruction of Economics," New York: John Wiley & Sons, Inc., 1950. Pp. xiii, 311. $4.50.

Colonial Advisory Council, "Report of a Survey of Problems in the Mechanization of Native Agriculture in Tropical African Colonies," London: His Majesty's Stationery Office, 1950. Pp. ix, 121. 4s. 6d, net.

Doane, D. Howard, "Vertical Farm Diversification," Norman: University of Oklahoma Press, 1950. Pp. xv, 184. $2.75.

*Filley, H. Clyde, "Every Day Was New," New York: Exposition Press, 1950. Pp. 179. $3.00.

Miller, Donald C., "Taxes, The Public Debt, and Transfers of Income," Urbana: University of Illinois Press, 1950. Pp. xi, 153. $3.00.

*Nelson, Lowry, "Rural Cuba," Minneapolis: University of Minnesota Press, 1950. Pp. x, 285. $3.50.

Reserve Bank of India, "Review of the Co-operative Movement in India, 1946–1948," Bombay: Caxton Printing Press, 1950. Pp. 134.

Shott, John G., "The Railroad Monopoly," Washington, D. C.: Public Affairs Institute, 1950. Pp. xi, 250. $3.00.

*Timmons, John F. and Murray, Wm. G., "Land Problems and Policies," Ames: Iowa State College Press, 1950. Pp. xiii, 298.

* Publications reviewed in this issue.

BOOK REVIEWS

Reconstruction of Economics, Kenneth E. Boulding. New York: John Wiley & Sons, Inc., 1950. Pp. xi, 311. $4.50.

The major significance of this important and highly original book to the agricultural economist lies in what it has to say on the theory of the firm. It is only in the past decade that research in farm management and in agricultural marketing has recognized the existence of the firm in the sense implied in current economic theory—or at least that anything serious about its existence has been done. The farm economist's error (*sic*) rested not in failing to take account of the firm, but rather in the fact that he attempted to convey the idea that his analyses had something to do with efficiency in the operations of the firm. There are those who have been critical of this state of affairs in farm economics—not, however, the reviewer, and not (as the reviewer now reads it) Professor Boulding. He would apparently have the greatest patience with those who attempted to make something useful out of the theory of the firm (as applicable to agriculture) and, giving up, returned to developing empirical rules of thumb—content that the sins (errors) of the fathers be visited unto the next generation.

Nearly a decade ago, in an article entitled "The Theory of the Firm in the Last Ten Years,"[1] Professor Boulding pointed to (1) the abstraction from the essential feature of enterprise—uncertainty, and (2) the neglect of time, as serious limitations in the accepted theory of the firm. Then in 1948 in a striking passage from his review of Professor Tarshis' *Elements of Economics*, Boulding wrote "The firm of the current marginal analysis is a curious bloodless creature, without any very definite assets, without a balance sheet, without a debt structure, without liquidity or other asset preferences. In this respect the state of current theory is curiously inconsistent. The student is most unlikely to meet the concept of a balance sheet, and works entirely within the narrow framework of income and cost concepts."[2]

It is against such a background that *A Reconstruction of Economics* was written. Professor Boulding now provides a theory of the firm built around the idea that "Everything that happens to a firm can be expressed by changes in the balance sheet" (of the firm) (p. 26). He casts this theory into a form understandable in terms of balance sheet accounting by defining production, exchange etc. in terms of increases, decreases or transformation of assets. Preferences are expressed by "preferred asset ratios" which show the proportion of the total value of the entrepreneur's assets which he wishes to hold in some particular form. Applying this concept to production possibility or production opportunity functions, the author develops "expenditure-receipts" and "supply-demand" curves. The bulk of the analysis

[1] *American Economic Review*, XXXII: 4: 1942; pp. 791–802.
[2] *Ibid.*, XXXVIII: 1: 1948, p. 94.

of the firm is then given over to recasting the accepted body of theory into this new framework.

In the latter half of the book Professor Boulding reconstructs macro-economic theory to make it consistent with his micro analysis. In this his major interest is in elaborating the structure of the macro-economic aggregates.

The whole book is introduced by two chapters which provide a very broad social theory or social framework into which economics fits. This the author describes as an ecosystem, one aspect of this theory being devoted to the actions and inter-actions of individuals (including firms and households), and the other to economic aggregates or populations.

Professor Boulding has written a provocative book—and one demonstrating the high order of analytical ability and originality we have come to expect from him. He stresses that the work is not definitive, that it represents an exploration. It is to be hoped that some of the new vocabulary introduced into the field of economics, e.g., "cybernetics," will not take hold.

DAVID L. MACFARLANE

Macdonald College,
McGill University

Land Problems and Policies, John F. Timmons and William G. Murray, editors. Ames: Iowa State College Press, 1950. Pp. VIII, 298.

This book is an outgrowth of the Land Economics Institute held at Iowa State College during the summer of 1949. It contains 15 separate articles—lectures delivered at the Land Problems and Policies Seminar of this Institute. Each article has a separate author. The authors are leaders in their respective areas of endeavor, and their articles summarize a wide range of experience and thought. The book is essentially a record of what they visualize to be our most pressing land problems, and the information, techniques, and tools of analysis in which they place their faith for solutions. In a few instances the authors, from a background of vested interests of previous indoctrination, plead for a particular cause.

The unity of the book derives from the community of the subject matter discussed, and the fact that there is strength in diversity when policies are at issue in a democracy. There are areas of agreement, but no unanimity among the authors, in points of view, problem formulations, or policy suggestions. The book is stimulating in its range from the calculated thought of the economist and political scientist, through the evangelical appeal of the torch bearers, to the warmth of words spoken contemplatively on behalf of preserving for all in perpetuity some of the wonders of nature.

The subject matter necessarily transcends the boundaries of economics, as Penn so well points out in his article. Questions of who wants what and how badly; questions of human reactions in human situations—evaluations

in a non-monetary realm—necessarily stand beside marginal increments, cost functions, and net value products in the shaping of policy.

Bringing together as it does some of the best ideas, information, and thinking current in the land policy area, this book can contribute considerably at the seminar level in Agricultural Policy and Land Economics. Most of the articles are not for the beginner. They can provide, however, an advanced jumping-off place for many higher-level discussions.

HOWARD E. CONKLIN

Cornell University

Western Stock Ranching. Mont H. Saunderson. Minneapolis: University of Minnesota Press, 1950. Pp. xiii, 247. $5.00.

This book will be fascinating to those interested in the western livestock industry and to those interested in the use of western lands generally. Ranch operators will find it helpful as will the professional people who deal with production, maintenance, and utilization of range resources. It will be valuable as a text in courses dealing with western stock ranching and as a reference in any course touching on land use in the West.

The first chapter devoted to delineating the range resources and ranch management regions of the Western United States is unique. Saunderson's description of the forage resource by regions illustrates the varying possibilities and limitations for livestock production, since the forage resource available may closely circumscribe the type of operation.

There are some good analyses of problems faced in ranch management in view of feed supplies and market changes. Range operators likely will feel Saunderson's viewpoint on carrying capacity is colored by his Forest Service experience.

Cost and income standards are presented in Chapter Six. One wishes Saunderson had drawn more extensively on his 25 years' study and analysis of stock ranches to have included more of this material directly usable by the ranch operator. The prospective operator and teacher would find this chapter most useful if the standards were set up on prices and costs closer to current conditions.

An excellent analysis of the management problem of western stock ranchers is found in Chapter Seven. Particularly interesting is the concept of "land use arrangements" in place of "tenure" as we usually use the term.

Federal public land use and administration is described in Chapter Eight. It sets forth the kind of situation facing the ranch operator as distinct from that where the bulk of the land is in private hands.

Saunderson emphasizes throughout the need for those dealing with grazing land to have technical knowledge of grass and forage equal to their knowledge of livestock management. Often only the trained observer can recognize forage deterioration in time to prevent severe damage.

Few operators own all the land needed in their operations. Water and

hay land control carries with it control over adjacent grazing areas. There is implication of the need for a military concept of strategy in planning the ranch operation as a result.

Saunderson's concept of balance between forage resources in terms of seasonal availability of several forage types which may be on the same land—as in Northern Plains—or in different areas as in mountain and intermountain sections and under different ownership, poses the fundamental problem facing western stock ranchers. It stresses the need for the operator to view the ranch unit as a whole. The map on p. 98 of a management plan based on a range survey is particularly significant in showing the type of problem involved in making the maximum use of the forage resource.

Saunderson lays considerable stress on the minimum ranch unit for technical efficiency and implies it is above this minimum that the operator's management ability reaches its greatest importance. "If a cattle ranch is to attain high technical operating efficiency, it needs 300–500 head of cattle. This size usually permits full exercise of the opportunity for classification of stock for management—use of grazing land—feed crops—specialized labor."

He indicates that the comparable figure for sheep ranching would be 6,000–7,000 ewes, in order to take full advantage of classification of the sheep for management.

ROBERT W. WILCOX

University of Idaho

Every Day Was New, H. Clyde Filley. Lincoln, Nebraska: Exposition Press, 1950. Pp. 179. $3.00.

Every Day Was New is a combination autobiography, history of the State of Nebraska, and an account of the development of the field of agricultural economics. It is full of human interest interspersed with good old-fashioned humor and the homely philosophy of a man who has really been "through the mill."

Dr. Filley's life as a farm boy overcoming the hazards of pioneering in the Great Plains, his "evolution" to a farm management professorship via teaching in the rural schools, his experiences in and with the state legislature, his work in the field of cooperation, and his honesty and courage in adhering to principle throughout, not only make interesting reading but serve as an example for others to follow.

ARTHUR MAUCH

Michigan State College

Rural Cuba, Lowry Nelson. Minneapolis: University of Minnesota Press, 1950. Pp. x, 285. $3.50.

This is another in a series of books by Rural Sociologists about rural life and problems in specific Latin American countries. Professor Nelson does not

limit himself to detailed sociological studies of Cuba, but considers many aspects of economic and political relations as well. Considerable space is devoted to the pattern of land use, the development of the farming systems, and the changing patterns of land ownership, as production shifted between subsistence crops and cattle to plantation crops, such as sugar and tobacco. The latter part of the book deals with social class structure, the family institutions, the level of living and educational problems.

While in Cuba, Professor Nelson induced the Cuban government to carry on a series of Special Surveys on levels of living, tenure conditions, family status, farming, rural people's attitudes towards problems, etc. The reports on these surveys provide details on actual conditions. Such information frequently is not available for Latin American countries except as superficial observations. By these means the reader is given considerable insight into internal relations in Cuba.

In the process of rounding out his picture of Cuba the author delves into political relations, labor organization including Communistic influences, and some of the economic aspects of large and small farms relative to plantation crops and international competition. While in the main he points out the problems rather than draws conclusions, he does sometimes make statements about (principally) political relations, which make the reader desire some of the careful documentation found in other parts of the book. Nevertheless, the book is a valuable contribution in making available information on rural problems and rural-urban relationships not usually found in books about Cuba.

LAWRENCE WITT

Michigan State College

NEWS NOTES

Merton B. Badenhop, University of Tennessee, received his Doctor's degree in Agricultural Economics from Purdue University January 28, 1951.

Karl Brandt, economist and Professor of Agricultural Economics in the Food Research Institute of Stanford University, served during October–December as a member of the first joint mission of the International Bank for Reconstruction and Development and the FAO to Uruguay.

Luther Brannon, Assistant Director of Agricultural Extension, Oklahoma, has transferred to the Paris office of ECA to take a major part in the development of the extension program of ECA in Europe. He recently completed his work for his Ph.D. degree in the Graduate School of Public Administration at Harvard University.

Robert Branson, who recently returned to the Bureau of Agricultural Economics from work on an RMA project in Puerto Rico, is transferring to the Fruit and Vegetable Branch of the Production and Marketing Administration.

William Bredo, who for the last three years has been Secretary of the New England Research Council, has joined the Washington staff of the Bureau of Agricultural Economics.

O. H. Brownlee, formerly Assistant Professor of Economics at the University of Chicago, has accepted a position as Professor of Economics at the University of Minnesota, beginning in the fall of 1950.

Daniel W. Burch, formerly working on farm taxation in the Bureau of Agricultural Economics, has joined the Division of Fiscal Analysis of the Bureau of the Budget.

Warren W. Burger, assistant professor now on leave from Cornell, has been recalled to active military duty and is serving with the Navy in the Pacific.

E. P. Callahan, Extension Economist at the University of Tennessee, resigned recently to accept a position as Extension Economist with the Federal Extension Service in Washington. His work will be confined to the Southern States.

Leslie M. Carl, State Statistician for Iowa, retired on November 1.

Guy Cassell has accepted an appointment as Assistant Professor in Extension Marketing at North Carolina State College, effective November 15, 1950.

James P. Cavin was a member of the United States delegation to the fourth Inter-American Conference on Agriculture and the second Latin American Regional meeting of the FAO in Montevideo, Uruguay.

Russell L. Childress, who received his Ph.D. degree from Cornell University, has been appointed Associate Professor of Agricultural Economics and Marketing at the University of Maryland.

Harold B. Clark, Assistant Professor in the Department of Markets and Rural Finance at the University of Kentucky, has been called into active service in the U. S. Navy with the rank of Lieutenant (S. G.).

Robert Clodius, who received his doctorate at the University of California, began his duties as assistant professor at the University of Wisconsin this fall.

Commerce Department's 1950 edition of "Suggested Research Problems: Business-Economics," contains statements from 181 leading businessmen and public officials, describing problems that need attention from university business and economic research workers. Copies will be sent on request to research supervisors and department heads in university economics, business, agricultural economics, and industrial management departments by the University Extension Service, Office of Industry and Commerce, Washington 25, D. C. The volume sells for 55 cents at Commerce Department field offices or the Government Printing Office.

C. L. Crenshaw has joined the staff of the South Carolina Experiment Station as Assistant Agricultural Economist.

Lee M. Day, after doing graduate work at the Iowa State College, accepted a position as assistant professor at the University of Wisconsin this fall.

Raymond J. Doll, who has been conducting research in farm management and teaching agricultural policy at Kansas State College, will become Agricultural Economist for the Federal Reserve Bank of Kansas City.

F. F. Elliott, Associate Chief of the Bureau of Agricultural Economics, has returned to Washington after two months in Uruguay as deputy chief of a joint mission of the International Bank and FAO. The President of Uruguay requested the mission to survey the agricultural resources of Uruguay and to make recommendations as to how they might be better utilized.

Gerald Engelman, until recently a cooperative employee of the University of Minnesota and the Bureau of Agricultural Economics, has joined the staff of the Bureau on a full-time basis.

Richard G. Ford, having completed course work toward his Ph.D. degree at the University of Chicago, joined the staff of the Agricultural Extension Service of the University of Nebraska in October.

Oakley M. Frost has moved from West Virginia, where he was in charge of the Agricultural Estimates office of the Bureau of Agricultural Economics, to the Division of Fruit and Vegetable Statistics in Washington.

Karl Gertel, who for the last year has been a cooperative employee of the Bureau of Agricultural Economics and Iowa State College, has transferred to the Washington office of the Bureau, where he will assist in flood control studies.

S. J. Gilbert has transferred from the South Dakota office of the Bureau of Agricultural Economics to the position of State Statistician of Iowa.

Margaret Jarman Hagood, Division of Farm Population and Rural Life, Bureau of Agricultural Economics, will be a visiting professor in the Department of Rural Sociology, University of Wisconsin, for the Spring semester. Mrs. Hagood will teach courses on population and social research methods.

Russell Handy, formerly associated with an RMA Market Garden project in New Jersey, is now in charge of the West Virginia Agricultural Estimates office of the Bureau of Agricultural Economics.

Peter L. Hansen, Bureau of Agricultural Economics, acted as technical consultant, interpreter, and trip leader for the recent visit to this country of 15 leaders of Danish farm organizations. The group toured midwest farms and visited state fairs, manufacturers of farm machinery, cooperatives, etc., in a study of American farm organization and programs.

Walton W. Harper, former graduate student at Iowa State College, has joined the staff of the Georgia Agricultural Experiment Station as Associate Economist.

W. E. Hendrix has returned to the Georgia Agricultural Experiment Station following a six-month leave to participate in the Economic Efficiency seminar at the University of Chicago and in a study of Under-employed Rural Families with Walter W. Wilcox, for the Joint Committee on the Economic Report, U. S. Congress.

Louis F. Herrman has transferred from the Bureau of Agricultural Economics to the Dairy Branch, Production and Marketing Administration.

Clifford G. Hildreth, Assistant Professor of the Cowles Commission and the Department of Economics at the University of Chicago, was recently appointed associate professor on that staff.

Max K. Hinds, previously Extension Economist in Marketing, University of Minnesota, has joined the staff of the Federal Extension Service.

A. M. Hodgkins has accepted an appointment as Assistant Professor and Assistant Agricultural Economist in Marketing at the University of Arkansas.

Leo M. Hoover, engaged in graduate study at Harvard University since September, 1949, will return February 1 to his position as assistant professor at Kansas State College.

H. F. Huddleston has joined the staff of the Division of Field Crop Statistics, Bureau of Agricultural Economics, and is assigned to research on crop-weather relationships.

Charles D. Hyson has been appointed Special Assistant to the Chief of the ECA Special Mission to Portugal.

V. Webster Johnson, Bureau of Agricultural Economics, has been in Tokyo since November on a three-month assignment as Consulting Specialist in Land Classification and Land Use to the Natural Resources Section, Supreme Commander for Allied Powers.

Richard A. King, previously with the University of Connecticut, is now associate professor at North Carolina State College.

Jerry M. Law has recently been appointed Assistant Professor in the Department of Rural Economics and Sociology, University of Arkansas. He was formerly Cooperative Agent employed by the Bureau of Agricultural Economics and the University of Arkansas and was leader for the Southern Regional Poultry and Egg Marketing Project initiated under the Research and Marketing Act.

Frank Lowenstein, formerly with the Bureau of Labor Statistics, has joined the staff of the Bureau of Agricultural Economics, where he is working on cotton in the Division of Statistical and Historical Research.

Lewis D. Malphrus, Assistant Agricultural Economist at Clemson College, is on leave to complete his work for a Ph.D. degree at Purdue.

Jack McElveen, recently employed in the Bureau of the Census, has joined the Division of Farm Management and Costs, Bureau of Agricultural Economics.

John L. McGurk, who recently received his Ph.D. degree from Cornell, has joined the Cornell University staff as assistant professor.

The name of the Department of Rural Economics and Rural Sociology at Ohio State University has been changed to the Department of Agricultural Economics and Rural Sociology.

Cary Palmer, formerly of the Washington staff of the Division of Fruit and Vegetable Statistics, the Bureau of Agricultural Economics, has transferred to South Dakota to assume the position left vacant by S. J. Gilbert.

Kenneth Parsons, after spending a year in Europe with the ECA, has returned to the University of Wisconsin.

Newton Mack Penny has completed the requirements for his Ph.D. degree at Cornell University, and has returned to the Agricultural Experiment Station, Experiment, Georgia.

Edmond A. Perregaux went to France in November to join the Food and Agriculture Division of ECA of the University of Connecticut.

Reed Phillips has transferred from the Bureau of Agricultural Economics to the Livestock Branch, Production and Marketing Administration.

Paul Putnam is acting as head of the Department of Agricultural Economics at the University of Connecticut while Dr. Perregaux is in France.

Sydney C. Reagan has recently been promoted to the position of Chief of the Economic Analysis Section of the Fats and Oils Branch, Production and Marketing Administration.

Fletcher E. Riggs, recently engaged in graduate study at Vanderbilt University, has been appointed assistant professor at Kansas State College.

Joseph Sales, who has been in charge of Census Price work in the Division of

Agricultural Price Statistics, Bureau of Agricultural Economics, has transferred to the Idaho office of the Bureau.

Fred B. Saunders, formerly Agricultural Economist at the Berry Schools near Rome, Georgia, has accepted the position of assistant professor at the University of Georgia.

Luke M. Schruben, previously leader of farm management extension work in the North Central States, has become head of the Livestock, Dairy, and Poultry Marketing section of the Division of Agricultural Economics, Extension Service, North Carolina.

Jim Shute has joined the Purdue University Staff as assistant professor, after completing his doctorate at the University of Minnesota.

Sol Sinclair, University of Manitoba, has been granted leave of absence to complete his work for the Ph.D. degree at the University of Minnesota.

Lloyd E. Slater recently left his position as Assistant Professor in Marketing at Cornell University to join the business staff of the New York State College of Agriculture.

Chester R. Smith, associate professor at South Carolina, was awarded a Ph.D. degree at the University of Virginia in June.

Clyde Stewart, Bureau of Agricultural Economics, will be in Logan for most of the first half of 1951, cooperating with the Utah State Agricultural College and the Bureau of Reclamation in an economic analysis of the Weber Basin Irrigation Project. He will then return to his present assignment at Bozeman.

Oscar C. Stine, Assistant Chief for Prices, Income, and Marketing of the Bureau of Agricultural Economics, has been assigned to SCAP to assist in developing outlook work in Japan.

R. H. Sutherland has transferred from the Division of Special Farm Statistics, Bureau of Agricultural Economics, to the Division of Field Crop Statistics.

James D. Tarver, for the last three years engaged in graduate study at the University of Wisconsin, has accepted an appointment as Assistant Professor in Rural Economics and Sociology at the University of Arkansas.

A special six-week summer school program will be offered at the University of Tennessee in 1951 on The Economics of River Basin Development in its relation to agriculture, using the TVA as a special case study. The seminars will be offered at the graduate level, and designed especially to fit the needs of foreign graduates.

Max M. Tharp is serving as Bureau of Agricultural Economics representative on the Arkansas-White-Red River Basins U.S.D.A. Field Committee, with headquarters at Tulsa.

D. M. Thorpe, Assistant Soil Conservation Specialist with Agricultural Extension Service, University of Tennessee, is on sabbatical leave, attending Harvard University.

George S. Tolley, formerly research associate, has been appointed Assistant Professor of Economics at the University of Chicago.

George Townsend has returned to the Division of Farm Management and Costs, Bureau of Agricultural Economics, after four years in private employment. He will work at Raleigh, North Carolina, on the feed utilization project of the Division in cooperation with North Carolina State College.

E. A. Tucker, after a year's graduate study at the University of California, has rejoined the staff of Oklahoma A. and M. College.

Constantin von Dietze of Germany has been appointed Carl Schurz Memorial Professor of Agricultural Economics at the University of Wisconsin for the second semester of the present academic year. He will teach a graduate course, conduct a seminar, and give several public lectures during his stay here.